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CONTENTS

Building for the Future..... 681
Disposition of Chicago Surplus..... 681
Cleveland Post-Payment Car..... 682
Forms of Contract for Purchasing Power..... 682
Center-Entrance Cars..... 683
New Fireproof Car Storage House of the Cincinnati Traction Company..... 684
Center-Entrance Car of the Washington Railway Electric Company.. 688
Improvements Made by the Capital Traction Company, Washington.. 689
Executive Committee in the South..... 690
Studies in Rail Corrugation..... 691
Cleveland Pay-as-You-Leave Car..... 692
Pittsburgh Meeting of Committee on Equipment..... 693
A Storage Battery Car Company..... 695
Convention of the Iowa Electric Railway Association..... 696
Meeting of Joint Committee on Multiple Unit Operation..... 701
Committee on Electricity, A. R. E. A..... 701
Calculation of Resistance and Rate of Acceleration..... 702
Manufacturing in Repair Shops..... 702
Metal Cross-Arms and Pins..... 703
Seamless and Weldless Sheet-Steel Gear Case..... 703
News of Electric Railways..... 704
Financial and Corporate..... 707
Traffic and Transportation..... 711
Personal Mention..... 713
Construction News..... 714
Manufactures and Supplies..... 717

BUILDING FOR THE FUTURE

It is quite customary in many industries, and this applies to many electric railroads, that shops or buildings are built or equipment is purchased in excess of the immediate needs. This may be done for various reasons, the most usual of which is to take advantage of a favorable market or ready funds. While this policy is sometimes justifiable, especially in the case of unimproved real estate, care should be taken before making the purchase to weigh carefully the advantages and the disadvantages of any considerable anticipation of a company's needs in all property subject to depreciation. It should be borne in mind that depreciation plus interest charges, even on buildings, seldom amounts to less than 10 per cent and may be much more. For instance, if a shop is built with the expectation that the requirements will gradually grow up to it during a period of five years, the extra building will have acquired an overhead charge during that time of over 30 per cent on the original cost of construction. This amount is based on a 10 per cent charge compounded on a non-revenue-producing investment equal to the cost of the idle part of the building reduced one-fifth each year for a period of five years. It is seldom that the advantage gained by the purchase of material or labor at any particular time will vary more than 20 per cent from the mean, but, assuming such a saving of 20 per cent in the case just mentioned, the final result would be a net loss of 10 per cent on the cost of that part of the building which was in excess of the actual requirements.

DISPOSITION OF CHICAGO SURPLUS

When the Chicago City Railway and the Chicago Railways Company turned over $1,870,907 as the city of Chicago's 55 per cent of the net profit of the business for the year ended Jan. 31, 1912, the city traction fund was increased to a total in excess of $8,027,000. This large sum has accumulated as a result of the traction settlement ordinance passed in 1907 and represents 55 per cent of the profit in excess of all operating expenses and after 5 per cent has been paid on the capital investment. It will be seen that the rate of increase of this fund for the past five years has been about $1,600,000 per year. Much interest is centered in the ultimate use of the money thus accumulated. The traction ordinance provides that the city shall deposit the amount so paid to be kept and used for the purchase and construction of street railways by the city. Some propose to carry out the suggestion in the ordinance and use it for purchasing the existing transportation facilities; others want to use it to build a subway, and still others suggest reducing the city's proportion and thus enabling the railway companies to expend the amount gained by the reduction in bettering the existing service. The railway companies have no objection to the use of the fund for purchasing the existing properties, nor would they object to material betterments in the nature of universal transfers between the surface and elevated lines and through routing of elevated lines that might have the effect of reducing the city's share of the net profits. Under a ruling of the Supreme Court the city may use the traction fund in constructing an inde-

pendent subway if it so desires, but if the fund is employed in this way and operated in competition with the surface lines in the downtown district, it would materially reduce the city's 55 per cent of the net earnings of the surface lines. In all probability the unification ordinance which is now in process of preparation will, when passed, establish a community of interests in behalf of the city and the financial organizations controlling the surface and elevated lines, and will contain some provision relative to the use of the city's traction fund which will be satisfactory to all.

CLEVELAND POST-PAYMENT CAR

The Cleveland pay-as-you-leave or post-payment car, which is described elsewhere in this issue, adds another interesting chapter to the present remarkable renaissance in street railway car design and operation. Probably the first person to suggest this reversal of passenger entrance and exit movement was William S. Twining, formerly chief engineer Philadelphia Rapid Transit Company, whose pay-as-you-leave designs for both single-end and double-end operation were described in the Street Railway Journal for Jan. 18, 1908. The platform arrangements of the Twining and Cleveland designs differ materially, however, inasmuch as the former provides for a platform cab at diagonally opposite corners alongside the bulkheads. On the Cleveland car, which is arranged for single-end operation, the motorman, although isolated, stands in his usual position opposite the center vestibule sash, so that there is no more need for a front bulkhead than there is for a rear bulkhead on a pay-within car. The rear bulkhead of the Cleveland car has a single door which leads to an exit passage under the immediate surveillance of the conductor. In agreement with Cleveland standards, the long rear platform has been retained for the convenience of smokers, who are at liberty to stand in the area between the conductor's railing and the dash. The longitudinal seating along the exit side of the car permits the use of a wide aisle. In theory, the pay-as-you-leave feature is quite attractive from the viewpoints of headway and fare collection, because fares can be paid more quickly as the passengers leave one by one at many points along the line than when many enter the cars with no cash in hand at a few busy corners. In practice, however, it may be found that absent-minded or dishonest passengers will leave at the front door at places where large numbers of people enter, and when the motorman is too busy with switch irons or otherwise occupied to stop them. The converse action—namely, the abuse of the front exit for entrance to prepayment cars—is much more unlikely, because the conductor has the opportunity of collecting the fare as soon as the motorman points out the guilty person and, of course, before the latter has ridden a great distance. Another apparent objection to the delayed fare payment scheme is the probability that time would be lost if the service conditions called for the unloading of large numbers of passengers at transfer points, theaters, baseball parks and the like, when some passengers might force their way out of the car without paying fare. It would seem, therefore, that a C. O. D. system of fare collection offers many difficulties unless the cars are unloaded at properly inclosed terminals and a policeman is at hand.

FORMS OF CONTRACT FOR PURCHASING POWER

An elaborate discussion has been going on in National Electric Lighting Association circles as to the proper form of contract for selling power to railroads. Various more or less intricate demand systems have been put into practice for this kind of work of which the results have been sometimes satisfactory and sometimes quite the reverse. The main question on the part of the railway is an extremely simple one. Can it purchase power from the central station company cheaper than it can generate the same power in a station of its own? If it can save by purchasing all the power it requires, it is likely to do so. If no saving can be shown over a conservative estimate based on the power production, there is no object in any contract.

In examining the subject, one should consider the magnitude and distribution of the load, the probable diversity factor as far as it can be ascertained, the effect of this diversity factor and the effect of the maximum requirements of the railway upon the output to be provided. From the standpoint of the central station the amount and kind of maximum demand is a somewhat important matter in settling the rate at which it can afford to supply power. The railway company, on the other hand, has to suit its maximum demand to the traffic which it carries and has to figure out the relation of its probable load factor to fixed and operating costs in its real or hypothetical station. So far as the railway is concerned, its costs, when determined, could be figured on the basis of cost per car per year, per car mile or on any other convenient basis. They would all come to the same thing in the long run. Any rate is built up of a group of factors of which, in establishing a basis for reckoning, some are accurately evaluated and others are taken by general average. The whole system of variables is too intricate to treat by any rigorous method. The maximum demand is commonly, but not necessarily, one of the factors ascertained with a fair degree of exactness. A good many questions have been raised as to the way in which the demand should be reckoned for railway service, whether on a maximum peak basis, maximum for a few minutes, for an hour or two, or for some longer period. Any one of these hypotheses leads to a good working result if its relation to the alternative hypotheses is known, otherwise not.

For example, if we take the not uncommon and reasonable view that the demand element in the price of power to a railway company should depend on the amount of capacity set aside for the railway company's use, that amount in kilowatts in the generators may be based on any kind of peak hypothesis. If one-minute peaks are considered important, then one must take into consideration the capacity of the generating machinery on a one-minute peak or a succession of such peaks under such circumstances as he may care to figure.

If short peaks are to be considered negligible, then the maximum demand may be figured on half-hour or hour peaks, each hypothesis involving its own set of conventions regarding the rating of the machines required to supply the service. For example, the very important recent contract for power in Cleveland between the Cleveland Electric Illuminating Company and the railway is based

on the long-peak hypothesis. Under the terms of the agreement the power company is to have before the first of next November a stand-by capacity for four railway substations with a total maximum demand of 15,500 kw. Now, this demand is reckoned as follows: Each month the demand at each supply station shall be reckoned by taking one hour out of each of three consecutive days, so that this aggregate of the three hours' output shall be the greatest obtainable during the month by this summation. In other words, the maximum demand is based on the maximum recorded in three one-hour peaks on three consecutive days. It is possible that some human being may know the relation of this particular maximum demand to the average load on the generators. If so, we shall be greatly pleased to have the process of obtaining the relation explained. In brief, if peaks as long as one hour are to serve as a basis for maximum demand, the generators must have an overload capacity not only big enough to take care of this hour maximum but to handle as well short peaks of very much larger amplitude.

So long as generators are rated very conservatively so that an hour peak may be carried with ample overload capacity in reserve for heavy five-minute peaks without endangering the machines or injuring the regulation, one can get along very comfortably on a long-peak hypothesis. If, however, as is not uncommon, generators are rated well up toward their ultimate capacity for an hour or two, one must be extremely cautious lest the neglected short peaks involve the station in trouble. A bigger generator must ordinarily be furnished for a given long-peak rating than for the corresponding short-peak rating, and this fact must be taken into account in figuring the stand-by charge on which the price is based. On large railway systems the difference between an hour peak and a five-minute peak for the maximum demand will generally be considerably less than on small systems. In other words, the value attached to the maximum demand in reckoning the price of power is very largely a conventional thing, depending on the underlying hypotheses. If the demand is known in advance, one can take it by general average and base the price of power on a flat rate per kilowatt-hour just as well as he can figure the demand rigorously and take the time at which it occurs by general average. As a practical matter, if one is going to base a maximum demand on railway peaks for the purpose of ascertaining the standby charge, a short-peak period is more important than a long-peak period. We are inclined to think that one-minute to five-minute peaks will often give a fairer basis of trading than half-hour or hour peaks. For intermittent service generally, if peak readings are to be considered at all, they should be those which express the severest conditions of service.

The only value of the maximum-demand principle to the central station is really the friendly pressure it may bring upon a railway company to adjust its system of operation so as to produce a good load factor and to avoid extreme conditions. For this purpose a demand based on short peaks is a very useful thing, but it really is no more scientific or logical to put the demand in the contract, aside from this practical reason, than it is to use a flat rate deduced with the average demand conditions as one of its factors. In other words, the whole matter resolves itself, not into the matter of so-called scientific rate making, but into the matter of drawing a contract so as to produce as far as may be possible good operating conditions on the one hand and good service on the other. For this purpose the demand on the short and severe peaks must not be left out of account, and this plus the simplest possible kind of meter rate should answer most purposes well. Assuming that one puts demand requirements in the contract for the purpose already stated, a price may as well be set per kilowatt-year of maximum demand as in any other way, this basis being as simple as any. The ultimate figures will come to the same thing in any event.

CENTER-ENTRANCE CARS

Elsewhere in this issue appears a description of a new center-entrance car which has just been built for the Washington Railway & Electric Company. This is the third low center-entrance car to be illustrated within six weeks, the first being the "stepless" car of the New York Railways Company described in the issue of March 16 and the second being the Brooklyn Rapid Transit car described in the issue of March 30. Each marks a different and distinct degree of departure from present standards.

The Washington car is designed most nearly in accordance with present practice. Its design even suggests the possibility of converting some forms of standard cars to the center-entrance type, and the use of any standard truck is possible. This latter condition also applies to the Brooklyn car, but the sloping floor and sliding doors of the Brooklyn car prohibit the rebuilding of standard car bodies in accordance with the new design. The New York car, with its drop sills, its end-seat wells and its extremely low truck bolster, resembles standard design in hardly any important respect. Both Brooklyn and Washington make use of a depressed center portion, or well, 16 in. above the rail in the former case and 26 in. in the latter. The highest points of the floors are respectively 32 in. and 36 in. above the rail. Neither the New York nor the Brooklyn cars use a step and in consequence there is no necessity for grab handles. Both have sliding doors. The Washington car, on the other hand, has an ingenious folding door which when open forms passageways for incoming and outgoing passengers, and it also has a folding step which works in connection with the door. One noteworthy feature of the Brooklyn and New York cars is the special provision made for the crew. In the former car the motorman occupies a cab similar to that on an elevated or subway car, and the space taken by this cab is available for passengers when it is not in use by the motorman. In the New York car not only is a separate cab provided, but both motorman and conductor are provided with permanent seats. Taken altogether, the three cars indicate an apparently satisfactory solution of the present demand for an operating unit which will give a greater seating capacity and which, through convenience of access, will improve operating conditions. It seems reasonable to believe that one, if not all, of the three types will be perpetuated, as they offer distinct advantages over end-entrance cars. They are, of course, really in the experimental stage as yet, and after an extended trial they may be found subject to objections which will offset their evident advantages. However, such a possibility appears to be decidedly remote.

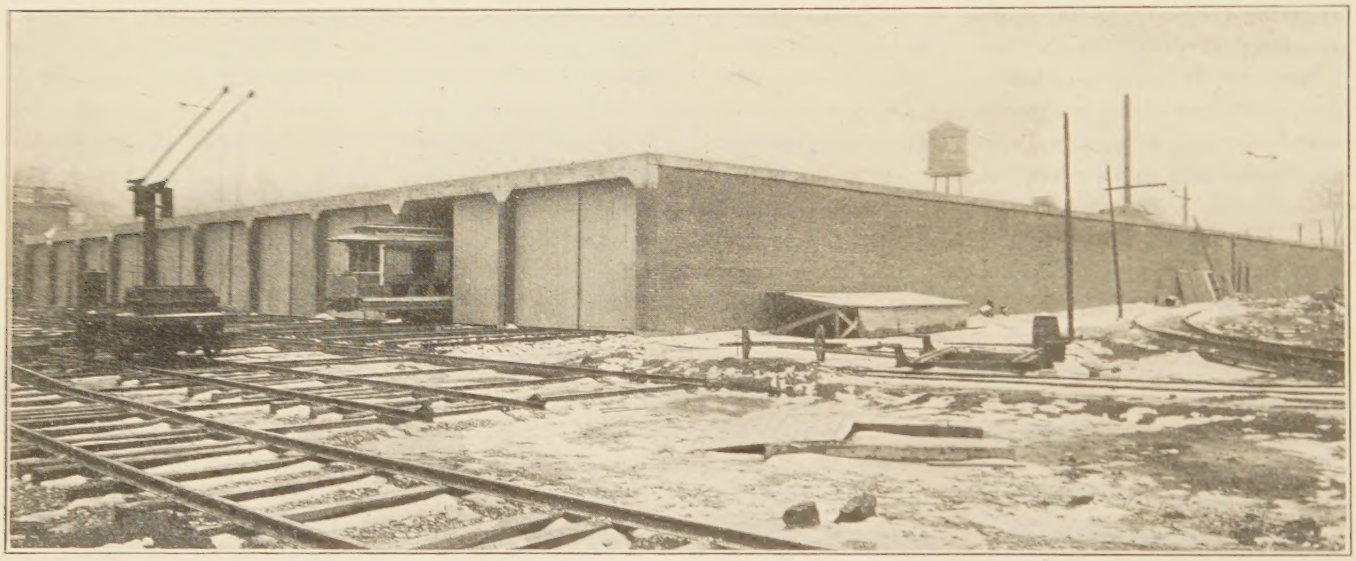
New Fireproof Car Storage House of the Cincinnati Traction Company

Detailed Description of a Fireproof Structure for Housing 374 Cars—Novel Features Include a Unique Roof Drainage System and the Use of Portable Curves Instead of Transfer Tables or a Ladder and Connecting Curves

The Cincinnati Traction Company has recently completed ten bays of a seventeen-bay car storage house on Donnell Street, in the northern part of the city, the location being across the railroad tracks from the Cincinnati Car Company and the Cincinnati Traction Company's repair shops. The present capacity of the house is 220 cars. This will be increased to 374 when the seven additional bays have been added.

The carhouse site is near the terminal of the Clark Street and Mitchell Avenue lines and is in a manufacturing district, so that it was unnecessary to spend any money to make the building match with adjacent structures, and it has been made as plain and simple as possible. The result is a very low cost for storage purposes per car.

The building was designed by the Cincinnati Traction Company's engineering department. The present structure, 211 ft. x 369 ft. 9 in. in plan, is of fireproof construction, being built of brick, steel and reinforced concrete. Monolithic concrete foundations support the brick walls. All the outside walls are 13 in. thick and are laid with red pressed brick and dark red mortar. The inside walls are of common brick and 9 in. thick.



Cincinnati Carhouse—General View Showing Rails on Which Portable Entrance Track Runs

To keep down the fire risk, there are no doors or windows in the exterior walls except the entrance doors in front and one small door in the rear. There is one opening in each division wall in the rear, which is equipped with double Underwriters' automatic closing doors. One object of these doors is to provide exit from the rear end of the bay in case a fire should break out. Since the openings are in the extreme rear it is improbable there would be any injurious effects by heat in case there was a fire. The bays are 20 ft. wide in clear, which provides ample space for two tracks.

The entrance to each bay of the carhouse is provided with two tin-clad sliding doors, 10 ft. 1½ in. wide and 14 ft. 1 in. high, the construction details of which are shown in the illustrations. These doors are mounted on separate tracks which are supported on bolts set in the heavy reinforced concrete lintels over the entrance. This method of hanging the doors allows only one track to be cleared at a time, but they are very simple and easily handled, and each door is provided with a lock, so that as each bay is filled up with cars it is protected against intrusion.

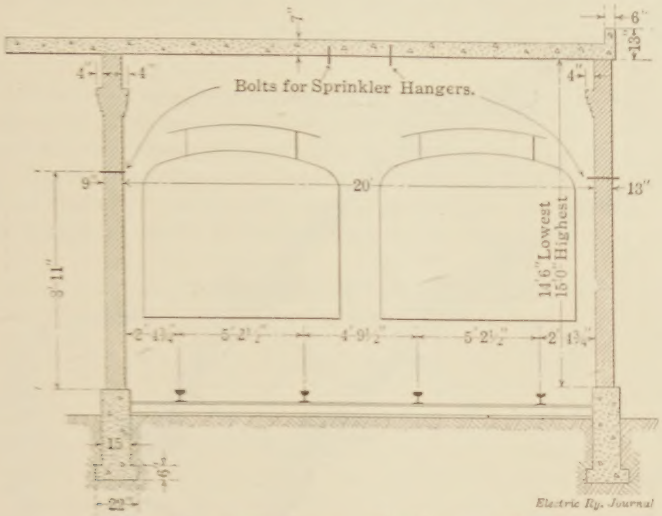
The roof is of reinforced concrete in a 7-in. slab. A detailed section showing size and spacing of the reinforcing is presented. One of the most interesting features in the building construction is the roof design, which, of course, requires no beams or projections of any sort. The cost of forms for constructing the roof slab was reduced to a minimum by corbeling out the sides of the brick walls, leaving a 4-in. projection five courses below the lowest point in the roof slab. These corbels were used to support the 2-in. x 12-in. timbers which were placed vertically and on which the forms were laid. These 2-in. x 12-in. timbers were spiked 12 in. apart in pairs, so that they were self-supporting, which eliminated all need of any bracing. Wooden wedges were used under the ends of these 2-in. x 12-in. timbers, so that it was an easy matter to adjust them and remove the forms when the concrete was dry. In fact, an old car with a large platform was used for this purpose. The forms were lowered and laid on the car, the car was then run along the track and the forms were then re-erected without having been taken down on the ground. They were similarly transferred from one bay to another when they were needed.

Before the plans were begun a survey of the property showed a natural slope across the bays of about 1/10 in. per foot. While this is less than is usually allowed for drainage, it was decided that with this method of construction and a tar and gravel roof it would be sufficient. Hence the elevations of the tops of the foundations and walls follow this general slope, and a natural drainage was provided on the roof slab. Slight depressions have been made at intervals of 48 ft. to form gutters.

No metal work or tin spouts were used to carry the water from the roof, but the roof slab projects a sufficient distance over the end wall on the low side of the building to protect the walls from the falling water. This drainage

system will be continued when the other bays are constructed, and a concrete gutter parallel with the low side of the roof will carry the water to the creek, which is closely adjacent.

Daylight is admitted to the bays through 5-ft. x 6-ft. skylights, spaced 48 ft. apart, at the high point of the roof



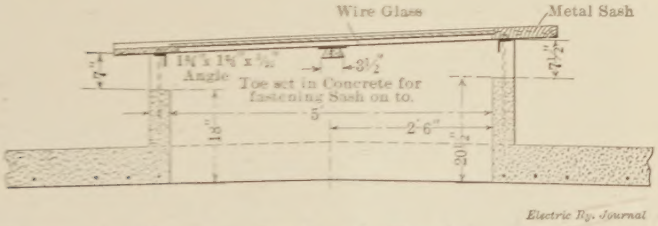
Cincinnati Carhouse—Section of Bay

along the center section of each bay. The skylights are elevated sufficiently to provide space for ventilation. Skylight construction details are shown in the illustration and consist of all steel frames mounted on concrete-curbed openings which are provided in the roof slab. The metal skylight sashes are glazed with wire glass.

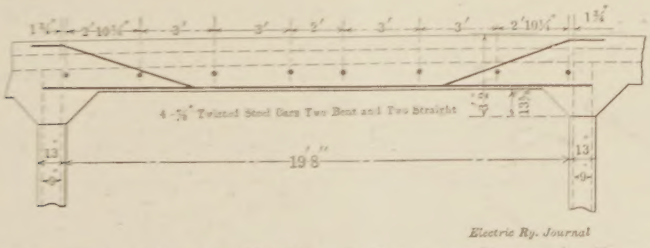
FIRE PROTECTION

A complete dry sprinkler system will be installed. Anchorages were embedded in the concrete during construction for the sprinkler system hangers, which will include three distribution pipes to each bay. Two pipes are supported on the partition walls at the height of the top of the average car window, or 8 ft. 11 in. above the tops of the rails, and the third will be supported on hangers in the roof slabs at the same elevation as those on the side walls. All outlets will be spaced 8 ft. apart and staggered.

Water for the fire protection system will be supplied



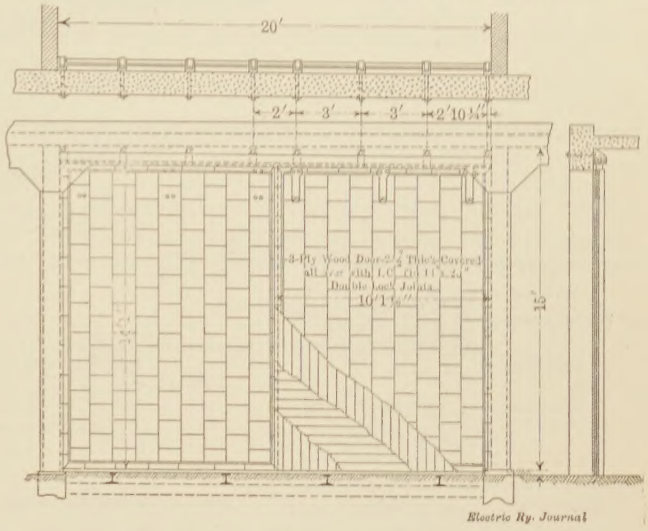
Cincinnati Carhouse—Detail of Opening and Concrete Curb for Skylight and Ventilator



Cincinnati Carhouse—Detail of Concrete Beam at Front of Building

from a tank of sufficient size to take care of the entire structure. This tank will be erected on a tower supported on the partition walls on either side in the rear end of Bay No. 9. The partition walls at this point have been reinforced for this purpose.

As this carhouse will be used for storing summer and winter equipment out of season, as well as surplus cars, the transfer of cars will be infrequent, and still further to eliminate the fire risk it has been decided to leave out all trolley wires and lights; in fact, there will be no electrical current in the building whatever excepting a push car

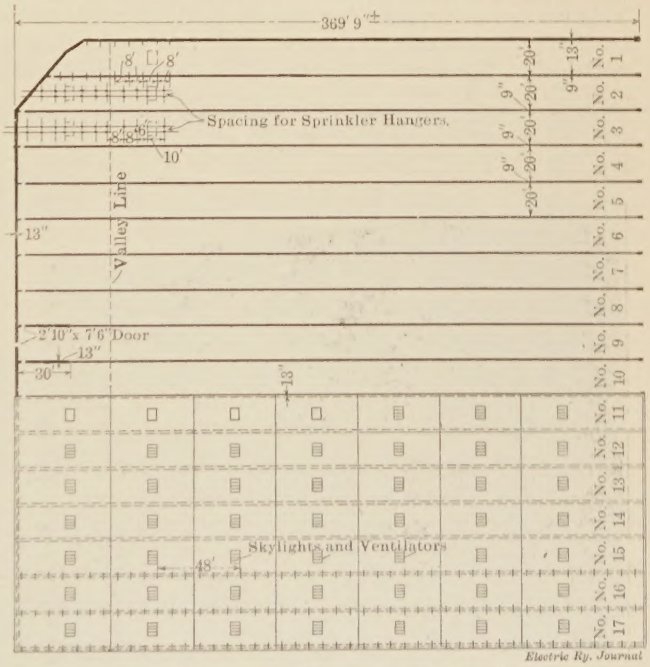


Cincinnati Carhouse—Detail of Doors

which will receive current from two cables mounted on reels, counter-weighted to take up the slack.

PORTABLE CURVE

To get cars on and off the storage tracks a portable entrance track curve is used, which of course was very much cheaper than thirty-four permanent curves. In fact, the portable curve cost less than $1,200. Since there are no trolley wires in the building and a push car is used to move the cars it would have been necessary to install a transfer table long enough to take two cars, but with the portable curve the push car can handle three or four cars at times, and an entire track can be emptied without changing the position of the portable curve, whereas with a transfer table two shifts would be necessary for each car.

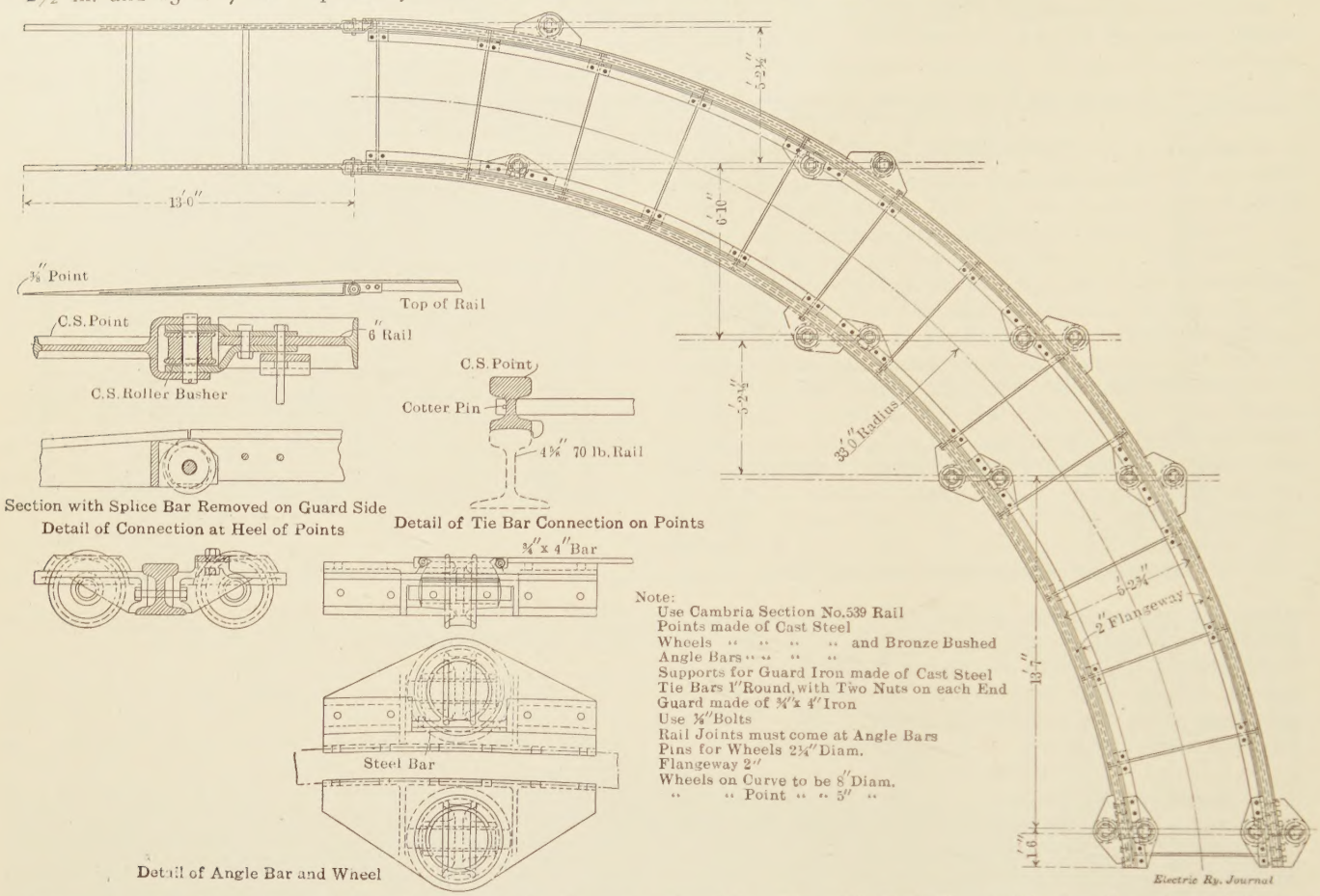


Cincinnati Carhouse—Plan of Storage Carhouse

The portable entrance track curve, as shown in the illustration, consists of two 150-lb. T-rails, which is the section generally used for large traveling cranes. These rails are curved to the radius as shown, and with the two approach rails which serve as switch points are mounted on sixteen wheels. These wheels run on five supporting rails. Two

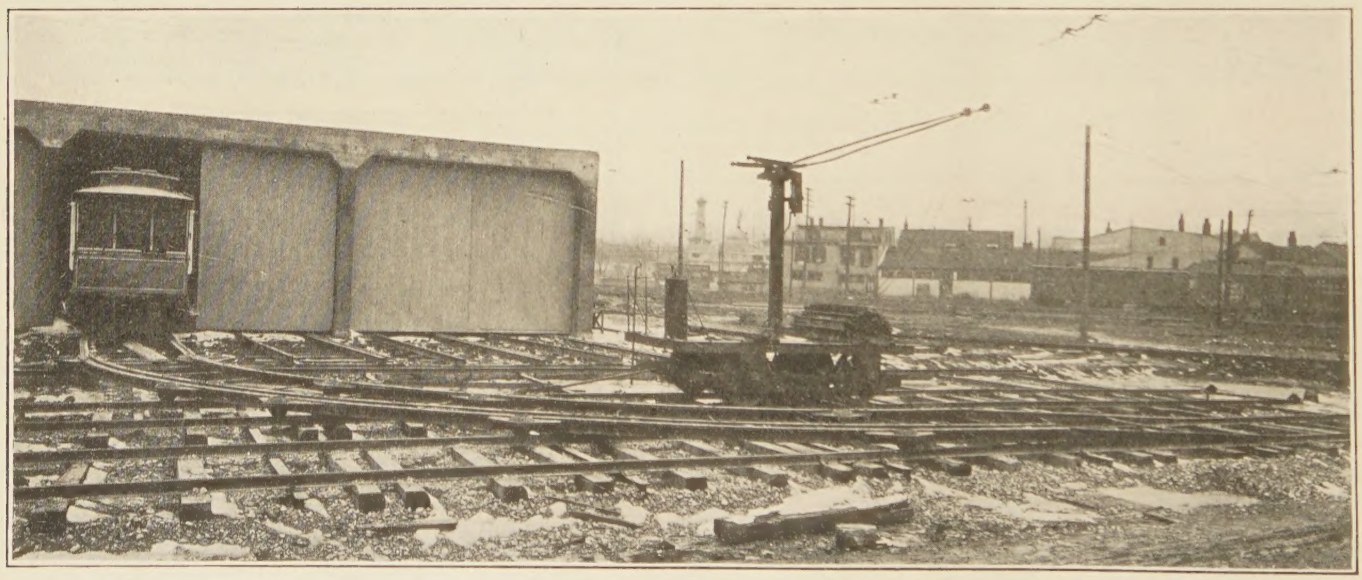
of them are the rails in the main track to the carhouse on which the approach rails are supported when the curve is in service; the other three are located 6 ft. 10 in., 5 ft. 2½ in. and 13 ft. 7 in. respectively from the main track. rails at the carhouse end of the curve holds it in place when it is in use.

Each wheel which supports the portable curve on its five rails is double-flanged and is mounted in a cast-steel angle


13'0"
5'2½"
6'10"
5'2¼"
38'0" Radius
⅜" Point
Top of Rail
C.S. Point
6" Rail
C.S. Roller Busher
C.S. Point
Cotter Pin
4⅝" 70 lb. Rail
Section with Splice Bar Removed on Guard Side
Detail of Connection at Heel of Points
Detail of Tie Bar Connection on Points
¾" x 4" Bar
Steel Bar
Detail of Angle Bar and Wheel
Note:
Use Cambria Section No. 539 Rail
Points made of Cast Steel
Wheels " " " " and Bronze Bushed
Angle Bars " " " "
Supports for Guard Iron made of Cast Steel
Tie Bars 1" Round, with Two Nuts on each End
Guard made of ¾" x 4" Iron
Use ¾" Bolts
Rail Joints must come at Angle Bars
Pins for Wheels 2¼" Diam.
Flangeway 2"
Wheels on Curve to be 8" Diam.
" " Point " " 5" "
2" Flangeway
13'7"
1'6"
Electric Ry. Journal

Cincinnati Carhouse—Plan and Detail of Portable Entrance Track for Use with Push Car in Moving Cars In and Out of Carhouse

This whole track system for supporting the curve is carried on wooden ties except that a steel rail replaces every fourth tie. The use of very heavy T-rails for the portable bar, which is securely bolted in position on the curve rails with 6⅞-in. bolts. The wheels are of cast steel and are bronze-bushed and 8 in. in diameter, except those under the



Cincinnati Carhouse—Front View Showing Portable Entrance Track and Push Car

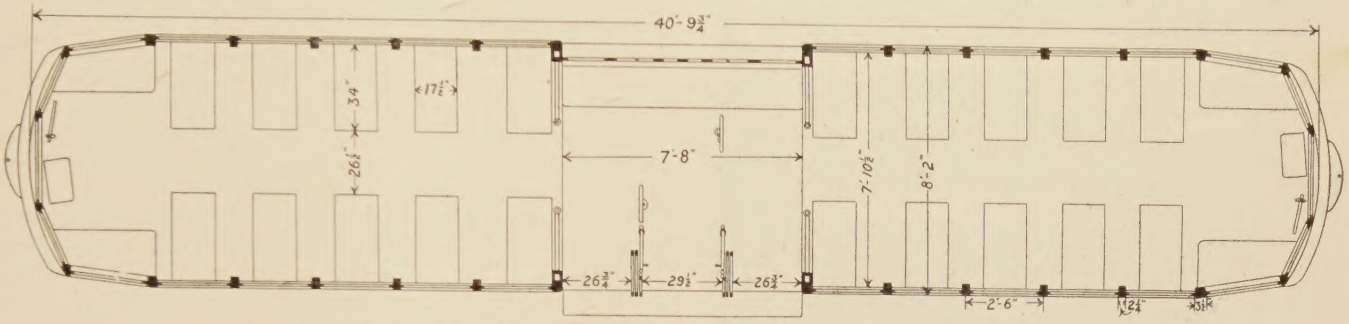
curve eliminates any necessity for close spacing of the supporting rails.

There is a difference in elevation between the running rails and the carhouse rails equal to the vertical height of the portable curve. A bolt lock on the gage side of the approach points, which are 5 in. in diameter. The rails were cut to such lengths that the combination angle bars came into the right position for the supporting wheels. One-inch round iron tie rods are used on the portable curve for adjusting its gage.

Center-Entrance Car of the Washington Railway & Electric Company

This Car Is Designed to Utilize Standard Equipment—The Car Body Is Built in Accordance with Existing Practice, Except for the Changes Necessitated by the New Type of Entrance

A new type of center-entrance car has just been built for trial by the Washington Railway & Electric Company. It has been developed primarily for the purpose of increasing the seating capacity of the operating unit and avoiding the use of trailers. Incidental to the larger number of seats and the improved loading facilities which are the natural results of the center entrance, the height of the first step from the ground, about which there has been so much recent comment, has been materially reduced. In general, the car has been designed strictly with the idea of adapting present standards to the use of center doors. Standard trucks are used, and the floor framing is as far as possible in accordance with usual practice. There are, however, a number of details which are distinctly novel.



Washington Center-Entrance Car—Floor Plan, Showing Arrangement of Seats

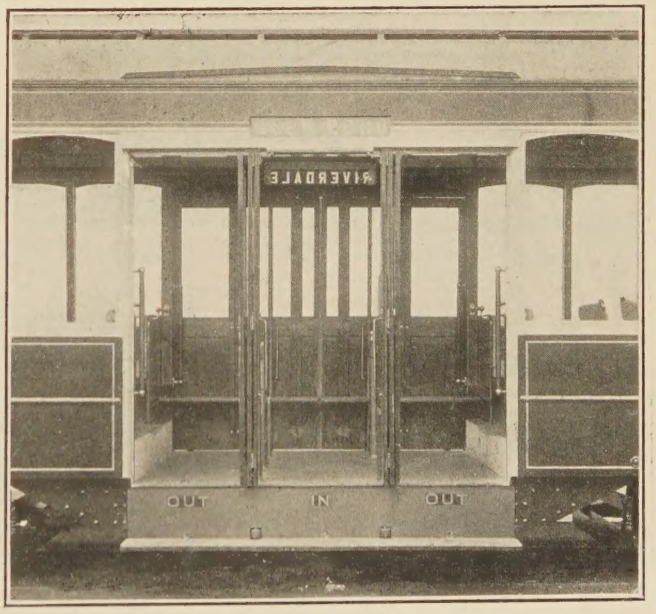
CONSTRUCTION

The car body is built up from a floor framing composed of wooden side sills, with deep sill plates and I-beam center sills, which extend for the entire length of the car and take the thrusts from the bumper beams at each end. The floor framing is complete in itself, and none of the weight is carried by the beam action of the car siding. In fact, no belt rail is used, and the side sheathing below the windows is of light wooden construction.

Each half of the car body is practically balanced upon one of the trucks, which are set upon the rather short spacing of 22 ft. between center pins. This dimension was required primarily because of the short transfer tables used by the railway, as a greater distance between trucks would have prevented the cars from getting into the repair shops. However, the fact that the trucks are brought close together permits a very light construction at the center of the car, which on account of the well and door openings might otherwise be difficult to support.

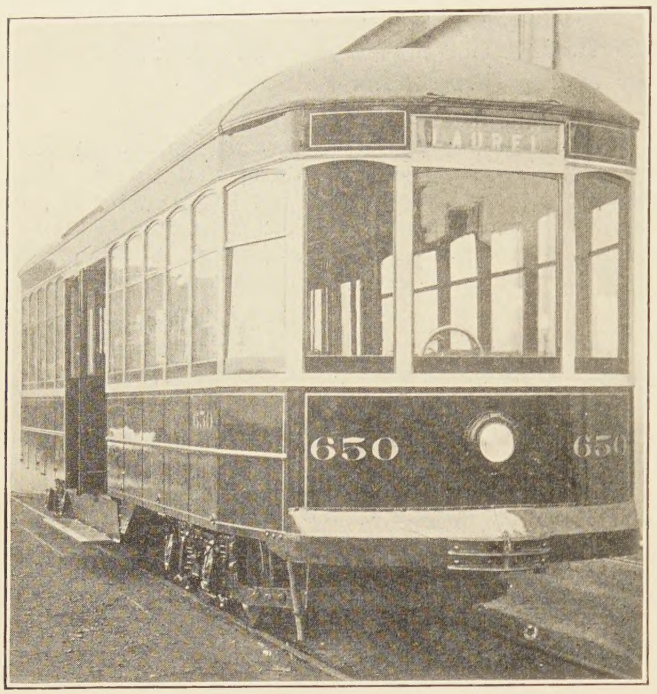
The floor of the well in the center of the car, which is 10 in. below the main floor level and 26 in. above the rail, is reached by means of a wide step which extends outside of the car for the full length of the well and is 13 in. above the rail. This folds up against the side sill when the door is closed. The center sills are bent down at an angle of about 45 deg. to pass under the well, being framed into the side sills about 3 ft. from each side of the well by a pair of needle beams. The side sills are stopped off at each side of the well and their ends are connected by heavy gusset plates to the sill plate at each side of the well.

Washington Center-Entrance Car—Pivoted Seats at Left and Door-Operating Handle on the Right



Washington Center-Entrance Car—Side View, Showing Center Entrance and Folding Step

Wooden posts and a plain arched roof are used. The windows are unusually high and are equipped with sashes which are hinged horizontally near the center and which, in consequence, can be raised up into the space between



Washington Center-Entrance Car—Side and End View of Car

the ceiling and the roof. These sashes are made with metal stiles, rails and hinges. They are not equipped with counterbalance, but the total weight is not excessive and they can be lifted with very little effort.

Standard two-motor trucks of the Brill outside-link suspension type are used. The wheels are 30 in. in diameter and the truck bolster plate is 26 in. above the rail.

ENTRANCE AND EXIT FACILITIES

The center doors are 7 ft. 8 in. wide. Each opening is divided into three parts by two posts upon each of which is pivoted a three-part door. The latter is made of two wide panels and one narrow one, the center of the wide panel in the middle rotating around the post. There are rollers at the top and bottom of the center line of the other large panel, which slide in grooves at the top and bottom of the doorframe. Similar rollers are placed at the top and bottom of the outside edge of the narrow panel, and these also slide back and forth on the track. By rotating the center panels on their respective posts the two outside parts of each door follow the track in the doorframe and either straighten out the doors so that they fill the door opening or collapse them to form division plates between the two exits and the entrance. The doors on one side of the car are operated by a crank placed waist-high above the floor of the well and on the opposite side of the car from the doors which it operates. The conductor operates this crank by hand. A connection on the same crank raises or lowers the step so that when the door is closed the step is folded up against the sill and no foothold exists for anyone trying to board the car.

Side seats are arranged on each side of the well. These seats are rotated into a vertical position on the side of the car where passengers are entering and leaving and help to form division plates for the incoming and outgoing passageways. On the opposite side of the car the door will, of course, be kept closed, and the side seats, when let down into place, prevent the door from opening, as they offer a permanent obstruction to the hinged portion of the door in case of an unintentional attempt to fold it up. The horizontal and vertical positions of the seats, together with the short posts at the inner edges from which they are pivoted, are shown in the interior view on page 687.

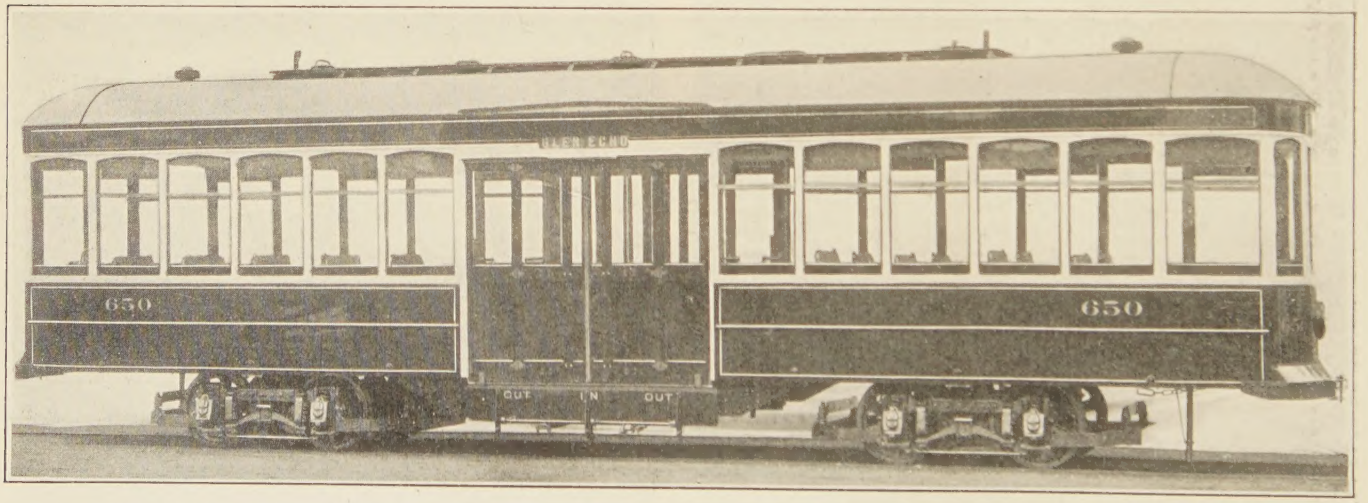
An automatic door signal which rings two bells in the motorman's cab whenever the door is closed is installed. This device is the invention of W. A. Wenner, master mechanic of the company, and it was installed by the Consolidated Car Heating Company.

It is not planned at present to use any form of fare box or coin register, as the conductor takes up fares from the passengers entering the car through the center one of the three passageways in the door. The two outside passageways in the door are to be used for exit only, and in this way the car follows the theory of the pay-as-you-enter type.

DIMENSIONS AND WEIGHTS

The principal dimensions and weights are as follows:

Length over bumpers	41 ft. 6¼ in.
Width over posts	8 ft. 2 in.
Width of door opening	7 ft. 8 in.
Centers of trucks	22 ft. 0 in.
From pavement to step	13 in.
Step to vestibule or well	13 in.
Vestibule to floor	10 in.
From rail over trolley boards	11 ft. 7 in.
Wheelbase of truck	4 ft. 0 in.



Washington Center-Entrance Car—Side View Showing Car with Door Closed and Step Folded Up

Diameter of wheels	30 in.
Height of truck center plate	26 in.
Weight of body without electrical equipment	15,120 lb.
Weight of non-plow truck	5460 lb.
Weight of plow truck	5620 lb.
Weight of car body per seat	286 lb.

INTERIOR ARRANGEMENT

The seating capacity will be fifty-three. Of these, thirty-six passengers will face forward, four backward and thir-

teen sideways. There is room for thirty-one standing passengers, making a total capacity of eighty-four for the car. This high capacity for a 41-ft. car is obtained largely through use of the space ordinarily occupied by the platforms and by the motorman, who will not be separated from the passengers. Two stanchions will, however, be placed immediately back of the motorman so that a curtain may be drawn down behind him at night in order to shield him from the glare of the lights in the interior of the car. On each side of the motorman will be longitudinal seats holding two passengers. These are at both ends of the car. At the rear end of the car standing passengers occupy the space devoted to the motorman at the front end.

Lighting of the car will be accomplished by two rows of incandescent lamps extending the full length of the body and set on approximately 3-ft. centers. There will be a total of twenty-six lamps, which will all be plain incandescent globes. The interior lighting will be used to illumine the signs at the side of the car. One of these signs is located over each center door and it can be read from the interior of the car as well as from the exterior. The route signs at the front and rear, however, are equipped with individual lights.

Globe ventilators in the roof will provide air circulation in the car, and in cold weather heated air will be brought in through the floor by the fan draft of a Peter Smith electric heater.

The car was constructed by The J. G. Brill Company in accordance with the ideas of C. P. King, president, and W. A. Wenner, master mechanic, of the Washington Railway & Electric Company. It is the trial car for an order of sixty which is to be placed within a short time.

IMPROVEMENTS MADE BY THE CAPITAL TRACTION COMPANY, WASHINGTON

Including its Seventh Street carhouse, which is now in process of reconstruction, the Capital Traction Company, Washington, D. C., during the past five years has rebuilt all of its carhouses and has constructed a new central power station and two substations, in addition to building 13.868 miles of single track on the underground conduit system. The work began in 1906 with the extension of the Fourteenth Street line when there were no double-truck cars on the city system. The old carhouses, therefore, had to be rebuilt to handle 45-ft. double-truck cars instead of 26-ft. single-truck cars, and new transfer tables had to be constructed to handle the larger equipment. This carhouse reconstruction included the rebuilding of the Georgetown three-floor terminal of reinforced concrete, steel and brick construction, while the carhouse was in continual use and without interfering with its operation.

CARHOUSE WORK AND CAPACITY

The Fourteenth Street carhouse, which has served as a model for all the later carhouse work of this company except at Georgetown, is a reinforced-concrete structure which was described in the Electric Railway Journal of Jan. 8, 1910. The Water and P Street carhouse is now being rebuilt according to the same standard. The Fourteenth Street carhouse has one story and a basement, the Navy Yard carhouse two stories, the Georgetown terminal three stories and the Water Street structure one story. The Navy Yard carhouse has no elevator, but the cars are brought to the higher level over an inclined track, which is made possible by the topographical conditions. The carhouse capacities are as follows: Georgetown, 142 cars; Fourteenth Street, 131 cars; Navy Yard, 209 cars; Seventh Street, 67 cars; or a total of 549 42-ft. cars (the company's present standard) in addition to 199 25-ft. cars. The Chevy Chase carhouse has a capacity for about eighten interurban cars.

The several carhouses are not only of fireproof construction, but are sectionalized by fireproof walls so that not more than forty cars are stored per section. Sprinkler systems are installed everywhere except at the Georgetown terminal, where the clearances were insufficient. A novel feature in this connection is the suspension of the lighting conduit and lamps from the aisle sprinkler piping. Provision is made in the carhouses for making minor repairs to the cars and equipments in a small overhauling section conveniently located. This is the only car section which is heated. Adjacent to this section are the sand-drying and sand elevator rooms, oilroom, men's quarters, receiver's and superintendent's offices, etc. The sprinkler supply tank is located on the roof of this utilities section in the carhouses equipped with the sprinkler system.

GEORGETOWN CAR ELEVATOR

A special feature of the terminal rebuilding was the installation of an Otis counterbalanced elevator made for cars up to 45 ft. long. With this elevator it is possible to take a car from either of the two storage levels to the street in two minutes. The maximum speed is 50 ft. per minute, and the length of travel from the first floor to the third floor is 34 ft. 1 in. This elevator, which is 12 ft. x 46 ft. in area, with a structural steel platform, is practically a duplicate of the elevator at the 146th Street shops of the New York Railways Company. One interesting variation, however, is that there is a slot for one-third of the platform length to take care of the contact plows of a car. Consequently the motorman can leave the elevator at once without making any adjustments.

The motor is guaranteed to run sixty round trips with 60,000-lb. load two consecutive hours, using 550 to 600 volts d.c., without any part heating more than 60 deg. C. above the surrounding atmosphere. The controller is of the electromagnetic type operated by a switch on the car. An automatic safety brake is applied to hold the car securely at the landing. This brake is actuated by spring pressure and is constantly in service except when electrically released during the normal operation of the elevator. It therefore applies instantly if the current supply is interrupted from any cause. An automatic safety device stops the engine when the car reaches the upper or lower terminal. The operating switch is arranged to turn automatically to the stop position and bring the car to rest should it be released by the attendant.

SHOPS AND POWER HOUSE CHANGES

The M Street shops in Georgetown were also enlarged in 1906 and rebuilt for double-truck operation. The reconstructed overhauling section of this shop is to be furnished with a heating plant, as steam will no longer be available from the Grace Street power station, which was located but a short distance from the shop building. The new Georgetown power station embraces many interesting features, especially in the turbine layout. It will be described in an early number of the Electric Railway Journal.

CARS

The first order for double-truck cars, given in 1906, covered thirty semi-convertible type and twenty-one of the open type. Early in 1908 an order was placed for twelve additional semi-convertible cars, and later in the year thirty-nine pay-as-you-enter cars were purchased. The twelve semi-convertibles were changed to pay-as-you-enter cars in the company's shops during the latter part of 1908. In this same year the company bought fifteen suburban cars of the pay-within type and equipped with air-operated folding steps and sliding doors. This made a total of sixty-six prepayment cars. All of these cars were bought to care for increased traffic. In 1910, after it was decided gradually to abandon the use of single-truck cars, 150 double-truck cars of the pay-within type were ordered. One hundred of these cars have been delivered and the remaining fifty will be received during the first half of this year. These latter cars are equipped with manually operated folding steps and folding doors.

Executive Committee in the South

Visits of the Executive Committee Were Made Last Week in Charleston, Augusta, Atlanta and Other Cities.

An account of the visit to Richmond of the executive officials of the American Electric Railway Association and of the American Electric Railway Manufacturers' Association, who are making a tour of the principal cities of the South, West and Middle West, was published in the Electric Railway Journal for last week. The party left Richmond for Charleston on the evening of April 18 and was met in the latter city on the morning of April 19 by officials of the Charleston Consolidated Railway & Lighting Company, including P. H. Gadsden, president; G. H. Waring, vice-president and general manager; C. M. Benedict, assistant secretary and assistant treasurer; T. W. Passailaigue, superintendent, and F. B. McKeown, advertising agent. The company's plant and system, including the new half-million-dollar power plant which is in course of construction, were inspected, and at noon the party met men prominent in the affairs of the city at luncheon at the Commercial Club. In the evening a large audience, representing every phase of business and professional life in the city, together with public officials, gathered at a smoker at the Commercial Club and was addressed by President McCarter of the Electric Railway Association, President Conwell of the Manufacturers' Association and Charles C. Peirce, of the executive committee of the Manufacturers' Association.

Mr. McCarter was preceded by Mayor Grace, who expressed himself as in favor of municipal ownership.

"With the very greatest deference to the Mayor," replied Mr. McCarter, "I disagree with almost everything he said. The average man does not understand this proposition. He thinks we are a lot of get-rich-quick fellows. I say to this audience, with all the responsibility that I feel in saying it, in my official position, that the electric railway industry as a whole throughout this country has not been a money-making enterprise. People seem to think that the elastic nickel will go around forever. It won't. The cost of everything which enters into the construction and operation of electric railways is constantly increasing. On the other hand, the companies are not getting the full nickel fare. They are getting from 3½ cents to 4 cents. The Mayor quoted me as standing for commissions, and so I do. I have come to believe, as a result of my experience, that given a commission composed of sober, thoughtful and courageous men who will study the needs of the companies as well as of the public, and given a sane law, a commission will be a protection and not a menace to properties of this character. By a sane law I mean one that confers on a commission the power of supervision as distinguished from that of administration. It is proper that such a commission should have the power to supervise with respect to capitalization and perhaps rate making—fundamental things; but if the law goes further and turns over to a commission the administration of these companies, you have the worst form of government ownership—government ownership without government responsibility."

The applause with which Mr. McCarter's terse and vigorous statement of his views was greeted indicated that his, rather than the Mayor's, was the attitude of the Charleston public on the questions discussed.

W. L. Conwell explained that the association which he represented comprised about 350 manufacturers whose products entered into the construction and equipment of electric railways. Hence they were in a specially favorable position to judge of the character of equipment and service required of electric railways. Not only was the cost of construction and equipment of the modern electric railway high, but in the case of many of them it had been necessary to abandon once or twice expensive equipment which was entirely sufficient at the time of its installation but had been supplanted by newer and improved types. No other industry had ever been compelled to scrap so much costly machinery in the same length of time, and this was a factor which many people failed to recognize when forming views respecting capitalization and earnings.

"It is a peculiarly unfortunate thing," said Charles C. Peirce, who followed, "that the unit of fare was made 5 cents. It is an unfair proposition on the face of it. We started with a short line in Boston, operated on a 5-cent fare basis, and now we are carrying people 16 miles for a nickel. That was not contemplated when the enterprise was begun, and we have reached this situation because those at the head of American street railways were too sanguine. When an extension has been demanded for the development of a suburb they have optimistically felt that it was possible to do a little more—then a little more yet—until the time has come when the companies are committing the economic error of selling goods below cost. That cannot continue. All the companies ask is an opportunity to give the very best service at rates which will enable them to meet their honest obligations and permit them to secure the capital necessary for further railway development."

VISIT IN AUGUSTA

The party reached Augusta April 20, remaining until the evening of Sunday, April 21. It was received by Vice-presidents J. H. Pardee and James U. Jackson and General Manager E. C. Deal, of the Augusta-Aiken Railway & Electric Corporation, saw the company's system and met at the Country Club of Augusta a large number of the representative men of the city. In the course of his address President McCarter said:

"There are those, of course, who say that there should be competition in the operation of public utilities. That I believe to be an error. History has a habit of repeating itself, and if in a city where there is but one street railway company another receives a franchise, in five years there will be but one company and you will be paying in fares for the support of both. Business of this kind is a natural monopoly. What you need is a regulated monopoly. If it is, as I have said, a natural monopoly, then it is right that it should be regulated, and if it is not a natural monopoly, then there is no reason why it should be treated as regards regulation in any way different from that in which other lines of business are treated."

President Conwell said at Augusta: "We, as citizens, as business men, as manufacturers, demand perhaps as strenuously as the rest of the people good service on the part of public service corporations, and we are perhaps the greatest kickers at service which we do not think adequate; yet we know that it is only by a generous support of these corporations, by a policy which will enable them not only to meet their present obligations but to lay aside a sufficient sum for depreciation or obsolescence, that there can be maintained a service in every way reliable and up to date."

Mr. Peirce said: "There is no reason in the world why we should not charge our customers on the same basis as that on which you business men charge yours. Good railway companies, recognizing this fact, realize that they are bound, as a sound commercial proposition, to keep their customers satisfied, and earnestly strive to that end. Give them your co-operation to that end. Let us strive to know and appreciate our mutual needs and to meet them."

VISIT IN ATLANTA

Monday, April 22, was spent in Atlanta. With President P. S. Arkwright, Vice-president W. H. Glenn, Treasurer

I. S. Mitchell, Jr.; S. E. Simmons, superintendent of transportation; O. H. Matthews, assistant superintendent of transportation; Milt Saul, manager of publicity, and other officers of the Georgia Railway & Electric Company, the party was taken over the company's lines. In the afternoon a visit was made to the power station at Bullsluice, on the Chattahoochee River, where the company has a maximum development of 12,500 hp. In the evening a reception was tendered the visitors at the Capital City Club, followed by speeches which were enthusiastically received. The audience was large and representative of every element in the city.

President McCarter discussed the alleged over-capitalization of public service corporations and the declaration of Senator La Follette that the steam railroads of this country are capitalized at $11,000,000,000, but could be replaced for $6,000,000,000, and that the $5,000,000,000 difference was water which he intended to squeeze out. He said that he personally owned no steam railroad securities, but that nothing could happen which would so blight the country as the practical carrying into effect of such a doctrine as that proposed by Senator La Follette. The man who did the watering, he said, if watering there was, had long since unloaded his securities, and they were now, for the most part, in the hands of honest purchasers for value. But when the cost of replacing old equipment with equipment of an improved type and the increase in the value of permanent property, such as real estate, were taken into consideration, he doubted if much water remained, and he thought that replacement value would be found to equal capitalization. All that the companies asked was that they should not be ground between the doctrinaire on the one hand and the demagogue on the other. They demanded only the right to live. Mr. Conwell and Mr. Peirce also spoke.

Mr. Conwell said: "This is a young industry. What a tremendous work has been accomplished in the twenty-four years of its existence! Yet the work remaining to be done is even greater, and it cannot be accomplished without the co-operation of the public. Capital is attracted primarily by the return got for its use. If conditions are such that capital is not attracted to electric railway enterprises, there can be no further development of those enterprises. Money is needed not only for construction and operation of the original lines but for extensions and for replacing old equipment with new. Only when the rates charged are such as to provide for these needs can the companies be in a healthy condition, and if they are permitted to fall into an unhealthy condition, the public must suffer through inadequate service. Either by the establishment of the zone system, by which a single fare shall be charged for a ride within the limits of the zone—perhaps extending for a radius of 3 miles from the center of the city—and another fare, proportionate to the distance traveled, where a passenger goes beyond the limits of the zone, or else, as has been permitted by the railroad commission in Massachusetts, by an increase of fare, where conditions render it just, the incomes of electric railways must be made adequate to their needs."

Mr. Peirce said: "It is no disgrace to be a public utility man. I am proud of the fact that I have put my life into the work. Nothing has entered more into the general culture of the American people than the American street railway. It has enabled the poor man to remove from the congested sections of cities, to establish a home in a pleasant and healthful suburb and to rear his family under the blue sky. Notwithstanding the wave of hypercriticism which seems just now to be sweeping over the country, I am confident that you realize how important a factor the development of electric railways is in the expansion of any city, and that you will not forget that this business, like every other, cannot be maintained except upon a sound economic basis."

The party reached Nashville early on the morning of Tuesday, spent the day in that city, Wednesday in Memphis and Thursday in Birmingham. It left Birmingham early Friday morning on the private car "Advance" for Mobile, which was reached Friday afternoon.

STUDIES IN RAIL CORRUGATION

On March 26 Prof. Alfred Schwartz and R. G. Cunliffe, Manchester Corporation Tramways, presented a paper before the British Institution of Electrical Engineers on "Rail Corrugation." They described a series of experiments conducted with a model car to determine the slip and skid which takes place with trail wheels under various conditions of load and track. They also conducted experiments with a small wheel running on a lead disk by which they secured a marked effect on the disk very similar to that in rail corrugation. In other experiments a steel cylinder was rubbed over and rolled over bars made of lead, pine, plaster of paris and other materials. The authors also obtained graphical records of corrugations in electric railway rail in actual use. These records were made in several ways. In one the rail was coated with black lead, then a strip of paper was laid on it and the upper surface of the strip was rubbed with a long block of wood. Similar records were made of steam railroad tracks, of third rails and of trolley wire, all of which showed corrugation. Corrugations were also found in parts of machines where there are sliding or rolling contacts and some freedom of motion of one or other of the parts concerned at right angles to the surface rubbed, as on the collector rings of alternators.

The authors conclude that corrugation is initiated by the action of one or more of the following forces:

(a) Jumping of the moving system on its passage over minute irregularities of the surface, or over an obstacle of some magnitude, when the critical speed is exceeded.

(b) Abrasion and displacement of the surface due to the difference between the static and dynamic coefficients of friction of the surfaces in contact.

(c) The longitudinal vibrations of the moving system.

(d) The transverse vibrations of the moving system.

The authors distinguish between two classes of corrugation on electric railway track and term them respectively visible and invisible. Invisible corrugation may be determined by graphite rubbing and may be due to the methods employed by manufacturers in straightening the rails, or by low points in the paving blocks by which the action of heavy vehicular speed traffic is brought upon the rails. Invisible corrugation does not appear to give rise to trouble in practice.

Visible corrugation on straight tracks is an augmentation of the invisible corrugation of short pitch present at almost all parts of the track. This augmentation may be due to variation in the specific pressure on the contact area between wheels and rail caused by the position of the wheel flange relative to the rail. An unequal diameter of wheels on the same axle or other causes will crowd the flange of one wheel against the rail and tend to make the wheel climb the rail, thus causing forces which give rise to visible corrugation.

In the foreign review of the *A. S. M. E. Journal* for April there appears a discussion to the effect that while mild steel alone rusts no more than wrought iron, very considerable corrosion in steam boilers may take place on account of the electrolytic action existing between steel and wrought iron. In boilers having wrought-iron shells and mild steel flues rapid corrosion may take place, and for this reason it is stated that boilers should be made completely of either one of these materials.

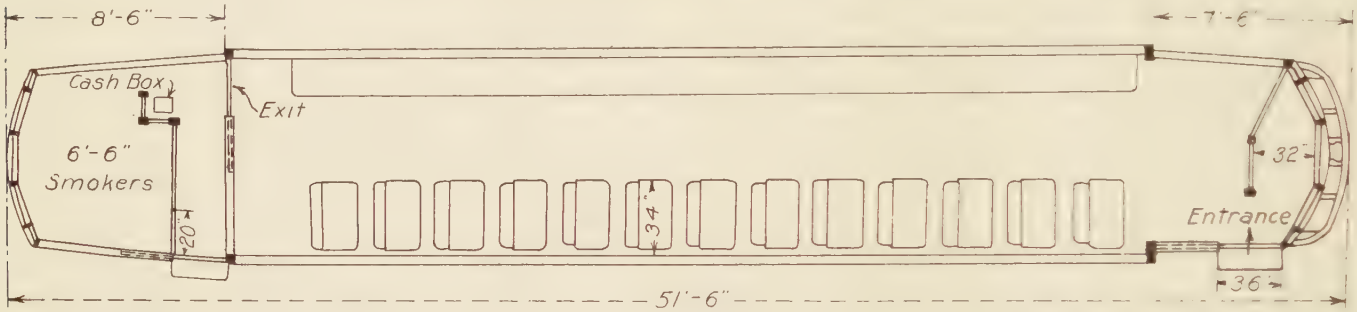
CLEVELAND PAY-AS-YOU-LEAVE CAR

At the suggestion of Peter Witt, street railway commissioner, the Cleveland Railway recently placed in operation on its Euclid Avenue line a single-end car, 51 ft. 6 in. long, which has been rebuilt for pay-as-you-leave operation in the company's shop under the supervision of T. Scullin, master mechanic. The car is operated single-ended in accordance with Cleveland practice.

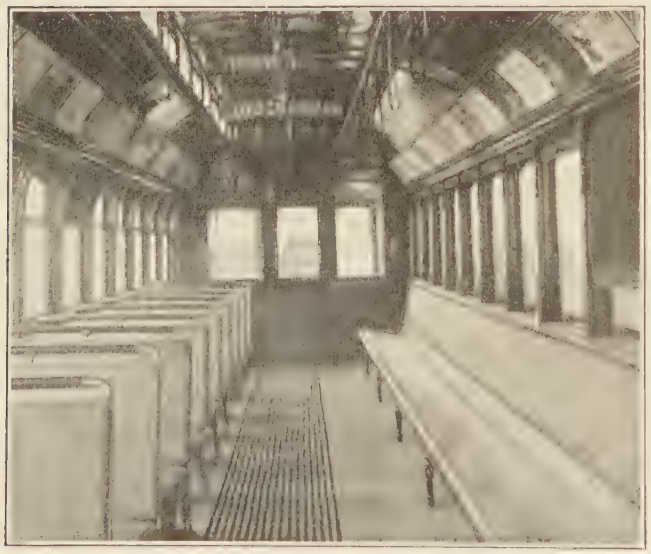
The front vestibule, which is used for entrance, is fitted with double sliding doors of a type designed some time ago by Mr. Scullin for the company's regular pay-as-you-enter cars. A folding step 36 in. wide is used to operate in conjunction with this door. An iron railing, open on the right-hand side, incloses a space 32 in. wide which is reserved for the motorman. The length of the front platform is 7 ft. 6 in. The front bulkhead was removed to facilitate ingress to the car body, but otherwise no structural changes were made at the front end of the car. Connections to a megaphone which is installed over the bulkhead frame at the top enable the motorman to give information that may be heard by all passengers. Passage through the car has been made convenient by placing thirteen 34-in. cross seats on the right-hand side of the car, that is, the right-hand side when one faces the front platform. A longitudinal seat is on the other side of the aisle. This combination of side and longitudinal seats is one which has been previously followed in Cleveland. As people enter at the front, they are requested to go to the rear and fill that portion of the car first, leaving the front part for later comers.

The rear bulkhead is fitted with one self-operating door on the right-hand side, facing the rear platform. This door consequently is on the side of the car farthest from the step on the platform. Located on the rear platform a short distance from the bulkhead and parallel to it is an iron rail which extends from the conductor's position to the single sliding door that forms the exit. The conductor's position is just back of this rail and is inclosed on three sides by a similar rail which also includes the fare box. An opening in the rail between this position and the side of the car allows passengers to enter the smoking space on the rear vestibule. A portion of the rail next to the exit is hinged for a length of 20 in. so that persons who are occupying the vestibule may pass out by raising this rail. The space from the rail to the rear vestibule wall, measured at the center of the car, is 6 ft. 6 in. The total length of the rear platform is 8 ft. 6 in.

Cleveland Pay-as-You-Leave Car—Sample Car, Showing Front Entrance and Announcements



Cleveland Pay-as-You-Leave Car—Plan of Seating and Passageway Arrangements, Showing the Liberal Width of Aisle and the Provision for Smokers



Cleveland Pay-as-You-Leave Car—Interior, Looking Toward Rear Exit

The conductor has a stamp, fixed to the railing at his right, with which he prints the time on transfers when issued to the passengers as they leave the car. This stamp is manufactured by the Automatic Time Stamp Company, Boston, Mass. As on other cars, the time limit for use on any of the lines named on the ticket is fifteen minutes. The entrance and exit doors are operated with levers by the conductor and motorman. It is possible that one of the West Side lines will be equipped with cars of this type in order to give them a more thorough test than is possible with one car.

BURNISHING CASTINGS BY RUMBLING

By introducing steel balls into a rumbling barrel, it is possible to polish castings and, in fact, actually to burnish them to a very high degree. Since the process is completely mechanical, it can undoubtedly be introduced in many brass foundries with the result of saving the labor costs of lapping or buffing. It appears to be customary to use enough steel balls to make up approximately twice the volume of the pieces which are rumbled, the size of the balls ranging from ¼ in. down to 1/16 in. in diameter. The latter size is used for articles with crevices or interior angles having small fillets.

Pittsburgh Meeting of Committee on Equipment

Specifications for Wheels and Axles, Squealing of Steel Wheels, Rubber Insulation, End Wear on Journals and Gearing Were Among the Subjects Discussed

A meeting of the committee on equipment American Electric Railway Engineering Association was held at the Fort Pitt Hotel, Pittsburgh, on Friday and Saturday, April 19 and 20. The committee members who were present were Frank R. Phillips, chairman, superintendent of equipment Pittsburgh Railways; E. W. Holst, superintendent of equipment Bay State Street Railway; J. M. Bosenbury, superintendent of motive power and equipment Illinois Traction System; L. M. Clark, master mechanic Indianapolis Traction & Terminal Company, and H. L. Patterson, chief engineer Mahoning & Shenango Railway & Light Company. Others in attendance were Henry J. Gulick, Gulick-Henderson Company; J. L. Davis, engineer Westinghouse Electric & Manufacturing Company; H. P. Tiemann, T. W. Williams and William I. Parry, Carnegie Steel Company; G. Aertsen, Midvale Steel Company; O. C. Skinner, Standard Steel Works; Charles H. Tomlinson, Ohio Brass Company; E. A. Craig and F. H. Parke, Westinghouse Air Brake Company, and W. G. Hovey and L. G. Martin, Okonite Company.

SPECIFICATIONS FOR HEAT-TREATED CARBON-STEEL AXLES, SHAFTS, ETC.

The first order of business was a discussion on specifications for heat-treated carbon-steel axles and other parts as submitted by a sub-committee composed of J. S. Doyle, chairman, superintendent of equipment Interborough Rapid Transit Company; John Lindall, superintendent rolling stock and shops Boston Elevated Railway and Mr. Phillips. The same sub-committee presented the reports on ordinary carbon-steel axles and on cold-rolled axles as hereinafter mentioned.

The specification submitted on heat-treated axles was substantially that which was tendered to the association in 1911 by the committee on heavy electric traction, approved at the 1911 convention and then referred to the committee on standards, which merely amended the specification covering the form of mandrel with which the cold-bend test was to be made. Later a committee from the American Society for Testing Materials considered the same specification and is said to be in favor of adopting it. Meanwhile, the executive committee of the Engineering Association had referred the subject to the committee on equipment for further review.

The report of the sub-committee as presented at Pittsburgh contained no further additions or criticisms upon this specification, but in the course of the discussion it was decided to consider the following changes before formulating the final report:

That phosphorus maximum be changed from 0.04 per cent to 0.05 per cent.

That axles, shafts or similar parts shall be allowed to become cold after forging; shall be re-heated to the proper temperature to refine grain (a group thus re-heated being known as a quenching charge) and quenched in some medium, and then re-heated to the proper temperature for annealing.

That one tension and one bending test shall be made for each annealing charge.

That if more than a quenching charge is represented in an annealing charge, one tension and one bending test shall be made from each quenching charge.

That if more than one melt is represented in an annealing charge, one tension and one bending test shall be made from each melt.

That if the results of the physical tests of any quenching charge of axles, shafts or similar objects do not conform to the requirements specified in sections 7 and 8, the manufacturer may re-heat each such quenching charge. Retests shall then be taken by the purchaser, and these shall govern its acceptance or rejection.

SPECIFICATIONS FOR ANNEALED CARBON-STEEL AXLES, ETC.

The changes proposed in the specifications for annealed carbon-steel axles, shafts, etc., are as follows:

That the maximum amounts of sulphur and phosphorus be changed from 0.04 per cent to 0.05 per cent each.

That the elastic limit be expressed as a minimum in pounds, say 40,000 lb. or 45,000 lb., instead of being placed at 55 per cent of the ultimate strength.

That the reduction in area be 35 per cent instead of 40 per cent.

That the opening of the paragraph on annealing read as follows: "Each axle, shaft or similar part be allowed to become cold [instead of "to cool"] after forging, and shall then be reheated to the proper temperature to refine the grain," etc.

Mr. Tiemann said that annealing tended to lower the elastic ratio. The true elastic limit was nearer 50 per cent. Mr. Gulick added that he had found it very difficult to get 55 per cent but in no case should it be less than 50 per cent.

Mr. Phillips said that it was desired to obtain an annealed axle of the highest physical properties, including elastic limit and tensile strength. The question was whether such an axle could be made commercial. The most important qualities were, first, elasticity and, second, ductility.

Mr. Tiemann thought that an elastic limit of 45,000 lb. was the highest which was consistent with the specified ductility. If the consumer wanted very high properties, say 50,000 lb. elastic limit or higher, he should turn to heat-treated axles.

Mr. Phillips said that he and others had some doubts about quenching. Mr. Tiemann replied that when properly done quenching was a decided advantage.

Mr. Holst thought that the most important thing was to have uniformity in axles, as it was not feasible to test every axle in a lot.

Messrs. Tiemann and Aertsen agreed that the chemical properties would be satisfactory to their companies if the maximum sulphur and phosphorus percentages for both regular and check analyses were placed at 0.05 per cent.

SPECIFICATIONS FOR COLD-ROLLED STEEL AXLES

There was little discussion on cold-rolled steel axles, but it was decided to consider an increase of the maximum phosphorous content from 0.04 per cent to 0.05 per cent, and also the elimination of the paragraph on retesting.

SPECIFICATIONS FOR STEEL WHEELS

The specifications for steel wheels were presented by Mr. Holst, chairman of the sub-committee on wheels, which also included H. A. Benedict, mechanical engineer Public Service Railway, Newark, N. J., and Mr. Gulick.

Mr. Holst reported that on March 28 and 29 a joint meeting, including representatives of the Master Car Builders' Association and the wheel makers, had been held with the American Society for Testing Materials to consider the tentative specification. The sections on "Process" and "Discard" had been agreed upon. Under "Chemical Composition," manganese was brought down to be "0.60 per cent to 0.80 per cent." The manufacturers felt, however, that fifteen points variation in carbon was pretty close, especially for users of the acid process. The limits "0.70 per cent to 0.85 per cent" had been left in, but a committee, of which Mr. Aertsen was chairman, had been appointed for further research.

Mr. Aertsen said that a swing of fifteen points in carbon was not enough as a practical manufacturing proposition, particularly when one bore in mind that this chemical requirement covered both acid and basic steels. A carbon limit of 0.70 per cent to 0.85 per cent was too close for the manufacturer of acid steel.

In reply to a question by Mr. Holst, Mr. Aertsen said that a range of 0.65 per cent to 0.80 per cent would also be too close for commercial conditions.

Mr. Tiemann stated that so far nothing had been done to determine what proportion of carbon gave the best wearing properties. The Pennsylvania Railroad, for example, permits as low as 0.55 per cent, whereas certain street railways have desired a minimum limit as high as 0.85 per cent without specifying any upper limit.

Mr. Holst said that the whole committee felt that 0.85 per cent was the highest safe limit. A fifteen point variation might work some hardship upon the manufacturer, but he felt that the variations should not be increased to twenty points until the manufacturer had tried to work at the lesser range. He had already obtained wheels with a fourteen point range in carbon. A small variation would give the great advantage of uniformity. His records showed also that higher carbon wheels gave longer life, especially in the higher mileage made before the first turning compared with the mileage made between later turnings of softer metal.

Mr. Tiemann remarked that in some cases the tendency of steam railroads appeared to be to desire low-carbon wheels, whereas certain street railways were looking for higher-carbon wheels than present standards.

Mr. Aertsen said that if the manufacturer received a specification with an upward rejection limit of 0.85 per cent he would work to some point below that, say 0.80 per cent. If 0.70 per cent was the rejection limit, he would not dare to work closer than to, say, 0.75 per cent. This meant that the manufacturer really had to work on a swing of five points, check analyses included.

Upon Mr. Holst's suggestion, the subject of carbon range was left open pending the report next June of Mr. Aertsen's committee to the American Society for Testing Materials.

Mr. Holst reported that the section on samples for chemical analysis had also been discussed at the joint meeting and that the question of ten-point variation in carbon in the same wheel, as shown by the analysis of drilling through the plates of two or four holes, had also been left open for further research. It had been declared in the discussion that two good chemists might be three points apart in analyzing the same drillings. A little dirt or oil could easily upset the results. The Testing Society had asked that a member from the wheel committee should also serve on that sub-committee.

The following additional changes in the wording of the specification will be considered by the committee:

That the section on "Workmanship" have inserted the word "rough" before "hub" in the sentence beginning "Wheels to be machined on both sides of hub," in order to avoid misunderstanding in fitting afterward.

That the height of flange, thickness of flange, radius of throat, rotundity and plane shall not vary more than 1/16 in. for rolled steel wheels nor more than 1/32 in. for machined steel wheels.

That the thickness of the rim shall not vary ⅛ in. below that specified, but omitting all reference to thickness limits above that specified.

That the width of the rim shall not vary more than ⅛ in. for rolled steel wheels nor 1/16 in. or 1/32 in. for machined steel wheels.

The question of the relation between the thickness of plate and weight of wheel was left open. Mr. Holst believed that the allowable weight variation might be considered in connection with the diameter of the wheels, such as 5 per cent for wheels up to 34-in. diameter. If the conditions could not be coupled, he would prefer to see the weight variation retained in preference to the statement that the thickness of plate should not vary more than ⅛ in. Mr. Clark thought that limiting the thickness of the plate would take care of the variation in weight. He suggested that a separate paragraph be drafted on weight tolerances.

In reply to Mr. Bosenbury, Mr. Holst said that the wheel committee had in hand the preparation of supplementary specifications to cover wheels for heavy electric traction.

It was stated that the section specifying the location of the center of the limit-of-wear groove should not vary 1/16 in. from specification had been inserted for the benefit of the small user whose mechanics may have little idea as to what the limit groove is.

The section on "Diameter of Hub" was changed to apply to the diameter of the hub in the rough. In this connection Mr. Bosenbury pointed out that the inside hub projection should be made to take care of a motor dust guard; otherwise the small companies that do not maintain an engineering department to make wheel and motor clearance drawings would be led astray by a standard specification. In accordance with this suggestion, the following paragraph will be embodied:

"The diameter of the hub may vary, but the thickness of the wall of the finished bored hub shall not be less than specified for bores 6 in. in diameter or under, and the thickness of the wall of the hub shall not be less than that specified, but may be ⅜ in. larger than that specified."

The question of mating wheels according to carbon content was left open for further discussion.

The committee accepted Mr. Phillips' recommendation that the question of designing a standard tape and gage for wheels be referred to the executive committee, since the design of a standard wheel contour would have to go before that of a corresponding tape or gage. The specification paragraph on this subject was retained, however, as a memorandum.

The supplement to these specifications, covering proposed form of contract, such as guarantees, definitions and interpretations of text and drawings, extras, etc., was retained as a guide for optional use by purchasers. However, the paragraph on "Holes in Plates" was omitted as needless.

COUPLERS

A sub-committee consisting of F. G. Grimshaw (chairman), Mr. Clark (Indianapolis) and Mr. Patterson had been appointed at the organization meeting of the equipment committee held Jan. 27, 1912, to report on couplers and other train connections. Mr. Clark stated that he had not yet received enough data sheets to prepare a report. He hoped to have one, however, at the next meeting.

GEARS AND PINIONS

A report on heat-treated gears and pinions was mailed by A. T. Clark, superintendent of rolling stock and shops, United Railways & Electric Company of Baltimore, chairman of the sub-committee on gears and pinions, which also includes F. G. Grimshaw, master mechanic Camden shops, Pennsylvania Railroad, and E. C. Blair, superintendent of rolling stock Montreal Street Railway. In his preliminary report, Mr. Clark discusses the development of gears from the cast-steel gear to surface-hardened gears and to gears, such as manganese, which are of hard composition throughout. For average conditions, the hardened gear and pinion would give at least twice the life of the non-hardened product. There had also been developed recently a rolled steel gear, which could be case-hardened after machining, and which appeared to represent the highest development of the gear situation. Mr. Clark's report contained tables showing the tensile strength, elastic limit, reduction in area, elongation, hardness and chemical content of the following classes of gearing: Cast-steel and cast-steel gears tempered in oil; forged steel, case-hardened gears (forging and casting); hard-alloy steel gears forged; pinions (low carbon); plain forged pinions (high carbon); heat-treated

forged pinions (low carbon) and heat-treated forged pinions (high carbon).

In the general discussion on gears, Mr. Williams called attention to the desirability of standardization. He knew of at least sixty-nine gear hub dimensions which were in use to-day. One motor manufacturer alone had over 800 gear patterns.

SPECIFICATIONS FOR WROUGHT IRON

Owing to the absence of the sub-committee, consisting of A. T. Clark, Baltimore, and C. F. Wood, Boston, no report was presented on specifications for wrought iron. It is probable, however, that these specifications will be similar to those of the Master Car Builders' Association.

HIGH-GRADE INSULATION

Mr. Patterson, chairman of the sub-committee on high-grade insulation, which includes Messrs. Clark (Baltimore) and Blair, said that there had been a meeting of the sub-committee in New York to discuss the best methods of testing and other matters. John W. Corning, electrical engineer Boston Elevated Railway, had prepared a written memorandum of procedure.

Mr. Phillips said this subject was primarily in the hands of the committee on power distribution, but the committee on equipment had been asked to consider specifications for car cables. One joint meeting, at which much work was done, had been held with the committee on power distribution. He expected that another joint meeting would be held this month. The principal matter was the percentage of pure Para rubber. The report of the equipment committee on this subject would be simply a résumé of what it did in co-operation with the power distribution committee, although the conclusions of each committee might not be the same.

END WEAR ON JOURNALS

The end wear on journals was brought up by Mr. Bosenbury, who stated that there were two remedies—one was to use a hooded wedge of brass; the other was to use an end-stock let into guides that are cast on the inside of the journal box something like a check plate. These guides should be part of the standard design of journal boxes, for use if desired. He said that he would report later on this subject after further investigations and correspondence with Messrs. Blair and Grimshaw.

SQUEALING OF STEEL WHEELS

Referring to the squealing of steel wheels, one member said that he had tried to lubricate the throat of the flange by using right on the brakeshoe three different mediums, namely, soft-iron inserts, asphaltum mixture and pig lead. The soft-iron inserts and the asphaltum seemed to increase the squealing, but the lead, as applied on the eight shoes of one car, practically eliminated squealing under any conditions. Contrary to expectations, the lead also increased the braking efficiency of the shoes. There is a tapered core in the body of the shoe in which the lead is peened. There may be a little squealing before the surface of the lead is reached. When the shoe is heated in service, the difference in the expansion coefficient of the two metals causes most of the strain to come on the lead with the result that the lead becomes smeared over the surface of the shoe like an amalgam. Such a shoe, of course, was expensive, as 3 lb. to 4 lb. of lead each was required for shoes which were almost worn out after ten days' service.

Mr. Clark believed that the resonant nature of steel wheels made them squeal more than cast-iron. The element of temperature seemed to be important, as there was more squealing on hot days than on cold days, or during the day than at night with other conditions equal. On long runs the wheels squeal more in the downtown sections with many stops than in the outlying districts, where the wheels and shoes become comparatively cool. He hoped to get some relief from some unflanged shoes which were soon to be tried. He had observed that squealing does not begin until the face of the shoe has become smooth. The exchange of new shoes for old had often stopped squealing for a while.

Mr. Bosenbury thought that it might be worth while to try a shoe made with a hole cored for a pencil of graphite.

SELF-PROPELLED CARS

The subject of self-propelled cars had been assigned to a sub-committee consisting of Mr. Holst, chairman; Mr. Bosenbury and W. Thorn, division engineer of cars Board of Supervising Engineers, Chicago Traction. Mr. Holst reported that he had already obtained many data on this subject, but that as more were to come it had not yet been tabulated. He proposed to treat the subject under three heads, namely, historical, development at the present time and future possibilities. The report will not include trackless vehicles.

NEXT MEETING

The next meeting of the committee on equipment will be held in Chicago on Friday and Saturday, June 14 and 15, at a place to be announced later.

A STORAGE BATTERY CAR COMPANY

The Railway Storage Battery Car Company has just been organized by F. J. Lisman & Company and associates as a selling and financing company of the Federal Storage Battery Car Company of Silver Lake, N. J. The officers of the new company are T. D. Rhodes, who retires from the vice-presidency of the New York, Westchester & Boston Railway Company and from the receivership of the Detroit, Toledo & Ironton Railway to become president of the new corporation. William Goodman, of the firm of F. J. Lisman & Company, is its vice-president. W. R. Brown, who has been connected with the development of the Beach car almost from its inception, is the sales manager, H. J. Pearson is treasurer and E. C. Rosenbaum is secretary. The offices of the company are located at 30 Broad Street, New York.

Since the development of the Beach car with the perfected Edison storage battery some three years ago, cars of this type have been put in operation between Mifflinburg and Montandon on a branch of the Pennsylvania Railroad in Central Pennsylvania, on the Long Island Railroad, on the New Castle & Delaware City Railway, on the Washington Spa Springs Railway, on the lines of the Suffolk Traction Company, on the Billings (Mont.) Traction Company and on lines in both North and South Carolina. These cars have proved especially adapted in point of economy and maintenance to branch line service on steam railroads and to city and interurban lines with light traffic. Besides the lines mentioned, Beach storage battery cars have been exported to Japan, New Zealand and Australia, and additional cars are under construction for the Long Island Railroad, for the Chicago Great Western, Chesapeake & Ohio, Erie Railroad, Cambria & Indiana, and for other roads. Mr. Edison has said that the use of his battery will be more general even than his electric light, and the new organization will broaden the means of handling the output of the factory at Silver Lake, N. J.

In a letter to *Power* a correspondent reports marked success in removing scale from a number of boilers and the prevention of the formation of new scale by the use of powdered graphite. In one case 3 quarts of graphite were used per boiler, and a small quantity was added through the feed water each day. The probable action was that the graphite, being a very poor conductor of heat, settled on the old scale and caused it to bake off. The process has the advantage of being purely mechanical in its action, and can under no circumstances combine or change chemically to form vegetable or mineral acids which may corrode the tubes and sheets of the boiler. However, as graphite probably acts to produce mild over-heating of the surface with which it comes in contact care should accompany its use.

Convention of Iowa Electric Railway Association

This Convention Was Held in Des Moines, April 25-27—Two Papers, One on Prepayment Cars, the Other on Railroad Financing in Iowa, Are Published in Abstract, with an Account of the Proceedings on April 25

WHY RAILROAD FINANCING IN IOWA IS DIFFICULT

BY F. C. FARWELL, ATTORNEY-AT-LAW

To cover the question of railroad financing by Iowa corporations even in a general way it is necessary to consider (1) the laws governing and limiting the powers of such corporations and (2) the laws applicable to railway and street railway properties which directly or indirectly affect the market for railway securities.

The power of a railway corporation to issue and sell its securities is of first importance. The corporation laws of this State, especially as applied to railway corporations, are very contradictory. The original corporation act may have been definite enough, but legislature after legislature has amended the law in one respect or another and from time to time has added new provisions until the results in certain particulars border upon the absurd. A method of financing which the law permits under one set of circumstances it denies under another with no apparent reason.

LAW ON ISSUE OF STOCK

The law does not limit the amount of stock that may be issued. It provides that no capital stock, or substitute therefor, shall be issued until the corporation receives the par value thereof, which must be paid in money or, if in property, after an appraisement has been made and permission of the executive council is obtained. The single exception to the rule is that for the purpose of encouraging the construction of new steam and electric railways the labor performed in promoting and perfecting the organization of the company and the reasonable discount or commission paid in selling bonds for the construction and equipment of the road shall be taken into consideration by the executive council, as elements of value against which stock may be issued. The officer, agent or director violating the law relative to the issue of stock is guilty of a crime and is subject to severe punishment, and stock illegally issued is void.

This law has effectively put a stop to stock watering in Iowa. While stock may be sold in unlimited quantities, the price must not be less than par, regardless of its merits. Established railway corporations whose stocks for a series of years have been selling upon the market at or above par, and which have a good record of paying dividends, are able to sell their stock in reasonable quantities at par, but the railway company the market price of whose stock is less than par is unable to sell any stock, simply because the market will not absorb new stock above the prevailing market price of its outstanding stock. A new railway company organized for the purpose of constructing a new railroad has never been able to sell any considerable quantity of stock at par. Hence the effect of the Iowa law is to limit the sale of stock in a new company to its promoters.

LAW ON ISSUE OF BONDS

The law conferring and limiting the powers of an Iowa railway corporation to obtain funds by issuing bonds and other certificates of indebtedness is involved and peculiar. The statute requires that the articles of incorporation fix the limit of indebtedness and that this limit shall not exceed two-thirds of the outstanding stock, provided that railway and street railway companies may, in aid of the location, construction and equipment of their roads, issue securities not exceeding $16,000 per mile of single track, standard gage, for each mile of railway or street railway actually constructed and equipped, regardless of the amount of capital stock. The Supreme Court in a recent decision has construed this statute permitting indebtedness of $16,000 per mile of completed road to apply only to the first cost.

A railway company organized under the laws of Iowa has authority to mortgage its property "to secure bonds issued by it to pay or refund its indebtedness, improve or develop its property . . . to be issued in such amounts, run for such length of time . . . and bear such rate of interest, not to exceed the legal rate in the State at the time of issue, as the company issuing the same shall determine." The Supreme Court has construed this section of the law to permit the issue of bonds secured by mortgage in unlimited amounts for the purposes therein named. The court has also held that the law confers no authority for the issue of bonds with which to build a new line of road and expressly has denied to an interurban railway company the privilege of issuing bonds in excess of $16,000 per mile with which to construct a new interurban road. The law further provides that any railway company may issue bonds for the construction and equipment of its railway with interest not exceeding 8 per cent per annum, make the same convertible into stock, sell the same at such price as it thought proper and secure the payment thereof by mortgage or deed of trust. This section has never been construed by the Supreme Court.

OTHER PROVISIONS

Another possible source from which funds may be obtained in aid of new electric or other railways is through taxation. A tax not exceeding 5 per cent upon the assessed value may be voted in aid of the road by any town, city or township. Upon the payment of the tax in aid of any railway, other than interurban and electric railways, the taxpayers are entitled to stock equal to the amount of taxes paid. Interurban and electric railways receiving taxes voted in their aid are limited by law to an indebtedness secured by a lien upon the property to an amount not exceeding $18,500 per mile of standard-gage road, not including debts for ordinary operating expenses.

Another section provides that "if the indebtedness of any corporation shall exceed the amount of indebtedness permitted by law, the directors and officers of such corporation knowingly consenting thereto shall be personally and individually liable to the creditors of such corporations for such excess."

GENERAL SUMMARY

The average cost of modern railways per mile is from $30,000 to $50,000. The methods of financing this cost per mile permitted under the laws of Iowa are as follows:

First—Stock must be sold at par. While the law does not limit the amount of stock that may thus be sold, the facts remains that the market for the stock of a new company is limited to the promoters and persons directly interested.

Second—Unless sufficient stock is sold so that for every dollar of indebtedness there will be a dollar and a half of stock, the company building a new line cannot bond the line in excess of $16,000 per mile.

Third—If taxes are voted and accepted in aid of the road, the limit of bonded indebtedness is $18,500 per mile, provided that that sum does not exceed two-thirds of the stock issued.

The foregoing limit applies to standard-gage roads. If a narrow-gage road is constructed, the mileage limit is $8,000 per mile. Inasmuch as $16,000 per mile will not nearly cover the first cost of any mile of road at modern

cost of construction, it follows that the only legitimate scheme of financing for the new line is to make up the deficiency by selling stock at par.

If the proposition before the railway company is the improvement and development of an existing interurban line, except where it has been aided by taxes, there is no limit upon its authority to issue bonds secured by mortgage to develop its property and refund its indebtedness and no limit upon its authority to sell stock at par. If the proposition is the development and improvement and the funding of the indebtedness upon an old line of street railway, there is no power in the company to create indebtedness by any method permitted by law in excess of two-thirds of the stock outstanding. The only method of financing open to an operating street railway where its limit of indebtedness already amounts to two-thirds of its capital stock is to sell new stock at par.

FRANCHISES

The market for street and interurban railway securities is unfavorably affected by the limited franchise granted on city streets. In special charter cities and in all cases where granted to interurbans the franchise is limited to twenty-five years. While the statute does not, unless by implication, prescribe a limit for purely street railways in any cities and towns other than special charter cities, the practice is to limit the franchise to a period not exceeding twenty-five years. The law contains no safeguards protecting the property of the road, and for aught the corporation stockholders and bondholders know the street railway, at the expiration of the franchise period, may have no value whatsoever except its scrap value.

A large part of the capital invested in railroads has always been evidenced by bonded indebtedness. Frequent financing is rightly regarded as inconsistent with good railroading for at least two reasons. First, to insure stability and reasonable growth, the railway corporation should have necessary funds and know that its obligations will not mature at a time when it will be unprepared to meet them, and, second, bond issues, which, as before stated, are a necessary part of financing, are always expensive because of discounts, commissions and incidental expenses. It is to the interest of all that this charge should not be incurred with more frequency than is absolutely necessary. Naturally, the tendency of modern railroad financing is to sell long-term bonds. In fact, it is becoming more and more difficult to sell a short-term bond upon advantageous terms.

In an open mortgage covering an important street railway property in the State of Iowa, in which the corporation has the right from time to time to issue bonds for extension and improvements, there is this clause: "None of the proceeds of the bonds certified under the provisions hereof shall be delivered by the corporate trustees on account of expenditures made for the construction of any extensions or improvements to the street railway lines of the company within the cities of ——— and ——— unless and until the company's street franchises or rights in said cities shall be extended or renewed for a period extending beyond Jan. 1, 1940."

As several years must elapse before the franchise in those cities in the ordinary course of events will or can be extended beyond the period named in the mortgage, it is apparent that the limited franchise not only handicaps the company in making needed improvements and extensions in said cities, but it may result in inflicting upon the public a transportation system greatly inferior to what it might and would have had were it not for the franchise limitation.

POWER OF PUBLIC OVER RATES

Another condition unfavorably affecting the market of railway securities of all classes, though one not peculiar to Iowa, is that the railway corporation is a public service corporation with the right reserved in the public to prescribe, through its commissions and the law-making power, what are termed "reasonable rates."

DESIRABILITY OF A STABLE POLICY

Government supervision and control of public service corporations has doubtless come to stay. From year to year the supervision will become closer and closer until little may be done by such corporations without first procuring the consent of a government tribunal. On the whole, it is believed that this fuller government supervision and control should be welcomed by the railway owner and investor, as well as by the public. Just now it appears to be in the transition period. Railway investments in the past have been and still are largely speculative. As the lines are drawn closer, the first effect seems to be materially to reduce what in years past were regarded as legitimate profits of such a speculative investment. This movement means that sooner or later the limit of returns that may be expected upon any investment in railway stocks or securities will be a fair return upon the capital invested. Thus far the movement has resulted in the material diminution of the returns upon railway investments without any corresponding compensation by way of stability of the investment. The investment still remains, except as to the older companies and larger railway corporations, peculiarly speculative. Under such circumstances it is only natural that the market for railway securities should be unfavorably affected. It is to be hoped that through wise and reasonable government control and supervision not only will the rights of the public be carefully protected, but also that the investment itself will become less speculative so that in time it will become safe and attractive to the conservative investor and thereby the market for legitimate railway securities will be materially widened.

It is peculiar that in a state like Iowa, with its large railway mileage and its rapidly increasing surplus capital, so little Iowa capital is invested in this class of property. There is no market in Iowa for railway stocks or railway bonds. The State is paying large tribute to the East, while its own capital is seeking investments largely in the newer parts of our own country and in Canada.

Railroad financing in Iowa is difficult because the corporation laws unduly limit the powers of railway companies in many instances to incur indebtedness except and unless the officers are willing to assume the personal liability imposed by law.

It is difficult because, even if the officers and directors are willing to assume such liabilities and penalties, the State, the stockholders, and undoubtedly the existing creditors, can by injunction enjoin the corporation from issuing any securities beyond the limit permitted by law.

It is especially difficult as to street and interurban railways because of our unfavorable franchise law, which limits the period during which they may operate upon the streets of our cities and makes no provision for the protection of the property of such corporations at the expiration of the franchise period.

It is difficult especially as to a new railway proposition because the investment in the securities of such a railway corporation is largely speculative.

It is difficult because the agitation for fuller supervision and control apparently has little in it reasonably calculated to conserve railway properties and protect legitimate investment.

And, lastly, it is difficult because the people of Iowa, although anxious for railway building and railway development, will not buy railway securities to any appreciable extent.

The subject does not seem to contemplate the consideration of any remedies. However, it may not be out of place to suggest that the corporation laws of the Sate should be amended so far, at least, as they place a limit upon the indebtedness of railway corporations. If a limit of indebtedness is to be prescribed, it should be a reasonable limit.

As hereinbefore stated, government control and supervision is fast becoming an accomplished fact. The time has

undoubtedly come when the railways have much to gain and little to lose by the fullest publicity. It would seem that the time has arrived when Iowa needs a public utility commission with adequate powers not only to supervise and control the railways in the interest of the public, but also to conserve railway properties and encourage investment therein. All interests should have a "square deal—no less —no more." The problem is a large one. Unfortunately it is the football of politics. It seems to be popular to give the railroads a kick. It is insisted that the railroads shall get out of politics and that they shall stay out. The demand would seem proper enough if it were coupled with a reasonable constructive program of wise legislation that would not only remove the railroads from politics but avoid the necessity of their being in politics.

SOME EXPERIENCES WITH PREPAYMENT CARS

BY R. A. LEUSSLER, ASSISTANT GENERAL MANAGER OMAHA & COUNCIL BLUFFS STREET RAILWAY

The first prepayment cars (twenty-five in number) to be placed on the system with which I am connected went into operation on Nov. 28, 1909. Accounts of the protest against prepayment cars in other cities had reached us and we planned carefully to avoid a like protest in our own case. We decided that we would place these cars on one of the lines patronized by our better-class passengers and start with them on a Sunday morning, reasoning that people had more leisure then than on week days and were, on the whole, better natured. We also prepared the public for the change by advance announcement in the daily press and by using some advertising space, calling attention to the advantages of the prepayment cars over cars of the ordinary type and asking for co-operation in making them a success. We called attention only to the advantages to the public and remained silent upon the advantages to the company.

A few days before the cars were actually put into service the exact date was announced by further notice in the newspapers, and when prepayment cars were put on other lines advertisements were inserted.

The new cars were received so well by the public and proved so satisfactory in every way that soon afterward we placed an order for thirty more and began at the same time to convert our ordinary type cars into prepayment cars. This was done by properly remodeling the rear platform and bulkhead and adding controlled doors at the front steps. We extended the prepayment system line by line, always starting on a Sunday morning and always giving advance notice to the public, until to-day we operate prepayment cars on all but one of our lines in Omaha. We have not seen our way clear yet to operate prepayment cars in Council Bluffs or on the line between that city and Omaha, on account of the diversified and somewhat complicated classes of fares on those lines.

The advantages claimed for this type of car, so far as the public is concerned, were enumerated in our cards to the public. The advantages claimed from the railway company's standpoint are increase of revenue and diminution of platform accidents.

INCREASE OF REVENUE

Nothing can be more attractive to any company or individual in the railway business (or in any other business, for that matter) than the promise of increased revenue without increased expense, for obviously that means increased net profits. The theory upon which the prepayment car offers increased revenue is, primarily, that, as the conductor is stationed at the only entrance to the car and collects the fare of each passenger as he boards the car, he, without fail, will get all of the fares due the company, and, secondly, that, being under the ready surveillance of secret inspectors, the dishonestly inclined conductor will be less prone to pilfer fares. "Missed" fares have been estimated by some companies to run as high as 5 and 6 per cent of the total receipts, and fares received but not registered to be about as much more. Personally, I regard both as somewhat overestimated. However that may be, it is conceded that both constitute a very serious item.

A very little observation is all that is needed to convince anyone that the prepayment car does get the so-called "missed" fares—or, rather, most of them—for it must be admitted that some dishonest persons still manage to get past the conductor without paying. Women are the worst offenders in this respect. At busy intersections during the rush hours some of them slip through the exit door if the conductor happens to be engrossed in punching a transfer, or turns his back for an instant to hand change or transfer to a passenger who has moved well toward the entrance door. Other women file boldly past the conductor, pointing backward toward following passengers, thus leaving him to infer that one of the other passengers is going to pay the fare. It has also been our experience with prepayment cars that a considerable number of fares are lost at the ends of lines during the summer months when pleasure riders remain in their seats and make the return trip without payment of fare. This is true particularly of lines that terminate at parks. Crowds of passengers are usually waiting and swarm upon the platform as the car arrives. After they have paid their fares and filed into the car it is impossible for the conductor to single out passengers who have remained in the car and to collect fares from them. Some fares also are lost if passengers board the car at times when the conductor has left it for the purpose of telephoning or assisting injured persons in case of accident, or while he is engaged in obtaining the names of witnesses on the street.

It is not intended to convey the impression that the loss of fares in the various ways enumerated approaches in amount the loss of fares under the ordinary method of fare collection, for such is not the case. Attention is called to these ways of escaping payment of fare merely to make it clear that the prepayment car does not do away entirely with "missed" fares. Careful calculation has shown that in our case the increase in revenue due to the adoption of prepayment cars amounted to 3½ per cent of the total receipts of those lines on which prepayment cars were placed. The basis used for determining the increase was as follows:

After prepayment cars had been in service on a given line for a while, we compared the ratio of that line's earnings to the total earnings of the entire system before the cars were put on with the ratio after they were put on, selecting for this purpose a series of normal days. We used this difference in ratios to calculate the increase in dollars and cents and then used the figures thus obtained to determine the percentage of increase.

It is not claimed that by this method of calculation the increase is, or can be, determined definitely, for it must be apparent to all that the ratio of any one line's earnings to the total earnings fluctuates from so many causes that a definite determination is out of the question. However, we selected days as nearly normal as possible for the purpose of obtaining our data, and it is believed that this basis gives a fairly accurate approximate figure.

FARE BOX

In connection with the collection of fares on prepayment cars, the fare box should come in for careful consideration, for the prepayment car and the fare box usually go together. In our case, they did not go together literally, but the fare box came soon after the prepayment car. We did not deem it expedient to put both into operation at the same time, because we felt that both conductors and the public ought to have time to assimilate one before the other was offered. In fact, we were not quite ready to decide on the particular box we wanted, because the fare box business was passing

through the experimental stage. After examining and investigating many types of boxes, we finally decided in favor of a box which automatically registers nickels, dimes and pennies as they pass through the box and then returns them to the conductor, thus enabling him at all times to issue change for money of higher denominations.

The installation of these fare boxes resulted in a further increase of revenue equal to about 1 per cent of the total revenue of the lines on which they were installed, or about 35 cents per day per box. For a while we felt serene in the thought that at last the company was receiving all of the fares collected by the conductors, but in a little while we discovered that a number of conductors were ingenious enough to beat the fare box.

DECREASE IN ACCIDENTS

Next in importance after the increase in revenue comes the diminution of accidents. A moment's reflection would undoubtedly cause anyone to say that the prepayment car must surely reduce the number of platform accidents. This seems a logical conclusion to reach, but as this paper deals with experiences with, and not with conjecture about, prepayment cars, I will give our actual experience for three years prior and two years subsequent to the adoption of prepayment cars. This experience is set down in the accompanying table.

Platform Accidents Before and After Introduction of Prepayment Cars.

Year.	Total Passengers Carried	Number of Platform Accidents	Number Passengers Carried per Platform Accident.
1907	51,583,019	221	233,408
1908	55,087,993	139	396,316
1909*	55,636,613	113	492,355
1910	62,957,597	210	299,798
1911	65,843,499	181	363,776

*First prepayment cars put into operation Nov. 28, 1909.

It will be seen from the table that our platform accident ratio has not been as low since the adoption of prepayment cars as it was during the two years preceding. As mere experience without explanation, however, may be misleading, it is only fair to state that during the years 1907, 1908 and a part of the year 1909 we conducted a vigorous campaign against all kinds of accidents. In September, 1909, we had a strike on our road and when it was over we found ourselves with a considerable percentage of new and inexperienced men on our hands. It is only reasonable to presume that inexperienced men would have a larger number of accidents than experienced men and that this explains the large increase in platform accidents in 1910. Added to this is the fact that since the strike our organization has had so many other things to straighten out that we are able only now to resume our anti-accident campaign. Even with these unfavorable conditions, it will be seen that 1911, with a larger percentage of prepayment cars in operation than ever before, shows a very decided improvement with respect to platform accidents over 1910 and compares favorably with all but our best year.

The prepayment car with us has given rise to two new kinds of claims. One kind is for injuries and damages caused by the motorman closing or opening the door at the front steps prematurely, damaging the clothing of passengers and sometimes injuring them in the one case or causing them to step from a moving car in the other case. The other kind is for injuries resulting from assault committed on passengers by the conductor in his endeavor to restrict the use of the exit door at the rear to exit only. Claims of the former class have not cost us very much money to date, but claims of the latter class have proved quite expensive.

This brings us face to face with the two really serious difficulties in connection with prepayment cars. One is the enforcement of the rule requiring passengers to enter only by way of the regular entrance and not by way of the exit door, and the other is the difficulty experienced in inducing passengers to move forward in the car so as to make room for other passengers and not to obstruct the passageway. When we first began the operation of prepayment cars we instructed our conductors under no circumstances to permit passengers to enter by the exit door. As this rule, however, sometimes worked hardship on individual passengers, as in the case of women accompanied by children at times when the entrance passageway was pretty well crowded, some of our conductors disobeyed instructions and permitted and even invited passengers to enter by way of the exit door. Other conductors carried out instructions to the letter, with the result that we received many complaints on this score. We thereupon sought to relieve the situation by instructing our conductors to permit passengers to enter by way of the exit-way, but only when the car was so crowded and the entrance blocked so effectually that entrance in the usual way was impossible. I feel now that this was a serious mistake. It certainly increased our troubles in this respect, as it left each conductor to determine for himself when it was proper to permit this practice and when not.

From our experience in this matter, I would say that it is of the greatest importance to keep the entrance and exit distinctly separate at all times and never under any circumstances to deviate from this rule, and it is highly important also to keep the passageway on the platform clear as long as there is any room either inside the car or back of the smokers' rail on the rear platform.

The difficulty experienced in inducing passengers to move forward in the car, so as to make room for other passengers, is a serious drawback to the prepayment car. It cuts down the capacity of the car very materially, besides often giving the appearance of overcrowding from the street when in reality the maximum capacity of the car has not been utilized at all. We have tried everything we could think of to overcome this difficulty, but seem a long way off still from solving the problem. We have a sign conspicuously displayed in each car urging people to use the front exit whenever possible, and display frequent cards in the daily papers, reading, for instance, as follows:

"Why not occupy the vacant space in the front part of the car, thus avoiding the pushing when you want to get off?"

"Has it ever occurred to you that when you block up the entrance of the car, either on the platform or just inside the car, you not only stand in somebody else's way but, in the end, in your own way?"

All of this, however, has proved ineffectual, and when two or three absent-minded or obstinate passengers plant themselves in the aisle near the rear of the car the conductor can shout himself hoarse urging them to move forward, and the other passengers can crowd, but they won't budge an inch, even though there may be vacant seats in front and the rear end is filled to overflowing.

Whether prepayment cars take on and discharge passengers more rapidly than ordinary cars and whether in consequence they cut down the running time have been much discussed. We find that they do not affect it. Our observation has been that at stops where the number of passengers boarding and the number alighting is nearly equal the prepayment car is more rapid, but at corners where a great number of passengers board and but few alight the prepayment car is slower than the ordinary car.

Summing up all of the advantages and all of the disadvantages of the prepayment car and weighing them against each other, our experience with it has been most satisfactory.

PROCEEDINGS

The ninth annual convention of the Iowa Street & Interurban Railway Association was held at Des Moines on April 25, 26 and 27 with about seventy-five members and guests in attendance. The following is a telegraphed account of the session held on Thursday, April 25.

OPENING BUSINESS

The first session opened with Acting-president Cass, Waterloo, as chairman. Mr. Cass introduced James R. Hanna, Mayor of Des Moines, who made an address of welcome. Mayor Hanna also spoke of the position which the utilities corporations held in society and of what they were doing for the development of city and state.

Frank Hanlon, Mason City, responded to the address of Mayor Hanna. He said that if a public utility property was well off financially and well maintained it would favorably impress the visitor, but if it was not it would give an unfavorable impression of the city in which the corporation operated. Visitors must use the local railway both in coming into and in going from a town, so that the railway gave them their first and last impressions. Street railways were doing much toward improving living conditions because their low rates of fare made it possible for the cities to spread out and thus develop desirable home districts.

Acting-president Cass announced that the president's address had been reserved for the executive session. H. E. Weeks, secretary and treasurer, then presented the minutes of the last meeting as prepared in book form. He also read a short report which showed that the association is prosperous financially. The present membership comprised twenty out of the twenty-five electric railways in Iowa. Mr. Cass then read a telegram from L. D. Mathes, president, who is now at Montgomery, Ala., expressing regret at his inability to attend the convention.

OPERATION OF LIMITED TRAINS

In the absence of P. P. Crafts, Davenport, his paper on the "Operation of Limited Trains on Short Interurbans" was read by the secretary. This paper will be published in the Electric Railway Journal for May 4.

The discussion was opened by Mr. Cass, who described Mr. Craft's time card and pointed out the complete detailed information it gave to the trainmen.

O. S. Lamb, Waterloo, described the limited trains which the Waterloo, Cedar Falls & Northern Railway operates for business men who live in Cedar Falls and work in Waterloo. All passengers must buy tickets to the end of the run because there are no intermediate stops.

Mr. Hanlon, Mason City, stated that he had found limited train service to be very profitable. The running time was only one-half of that for local trains over the same route. The local trains were required to clear the limiteds by ten minutes, and this clearance time was adhered to strictly. His road, the Mason City & Clear Lake Railroad, had put on the limited service because of the automobile competition afforded by a fine highway which ran parallel to the railway.

NOMINATIONS

In appointing the committee on nominations, Acting-president Cass called attention to a proposed amendment to the constitution of the association whereby a board of five directors, instead of the present system of officers, would have charge of association affairs for five years. One director would be retired each year and a new one elected to take his place.

PREPAYMENT CARS

The afternoon session was opened by R. A. Leussler, assistant general manager Omaha & Council Bluffs Street Railway, with a paper entitled "Some Experiences with Prepayment Cars." Mr. Leussler's paper is printed elsewhere in this issue.

In the discussion which followed J. R. Harrigan, Des Moines, and Mr. Leussler described the mechanism of various types of fare boxes. Mr. Leussler said that his road was using the Johnson registering fare box.

Mr. Cass did not favor the registration of transfers, as this gave them a value like tickets or cash. He also asked for data as to the operation of prepayment cars without platform guide rails for entrance and exit. Mr. Leussler replied that his road had tried to operate the cars without the guide rails, but the experience had not been satisfactory. Continuing, in answer to a question by Mr. Cass concerning the value of motormen's mirrors, Mr. Leussler said that his road had found that they helped greatly to reduce platform accidents. In fact, mirrors had been installed on all prepayment cars.

W. H. Evans, Edgar Allen American Manganese Steel Company, gave a history of the development of the prepayment car and fare boxes at Buffalo.

Peter Valier, general manager La Crosse (Wis.) City Railway, asked for a comparison of recording fare boxes and non-recording boxes used with a register in the car. Replying to this query, Mr. Leussler stated that the non-recording fare box kept the conductor out of small change, nor could the conductors register fare-box fares accurately on a separate register when there was a rush of passengers on the car. The method of checking transfers was dependent upon the size of the road. Thus on the Milwaukee system no register was used.

L. E. Gould, Electric Railway Journal, said that the method used in Milwaukee was probably employed because of the large number of tickets used.

EXPERIENCES ON SMALL ELECTRIC PROPERTIES

The next order of business was a paper by J. P. Walters, secretary Tama & Toledo Railway, on "Experiences on Small Electric Properties."

Mr. Leussler in discussing Mr. Walters' paper emphasized the point that the public is more concerned about the character of service than the rate of fare.

Mr. Cass told about the experience which his road, the Waterloo, Cedar Falls & Northern Railway, had had in competing with a paralleling steam railroad. The electric railway charged a higher fare, but still it got all the traffic. The steam line did not give the character of service desired and hence it obtained hardly one-tenth of 1 per cent of the business.

The convention was then adjourned until Friday morning, April 26.

THE BANQUET

The annual banquet tendered to the Iowa Electrical and the Iowa Street & Interurban Railway Associations by the supply men and manufacturers was held at the Savery Hotel Wednesday evening, April 24. About 250 persons were in attendance. The toastmaster was H. C. Blackwell, Davenport. The speakers included N. T. Guernsey, Des Moines, who spoke on the subject "Should Public Utilities Be Pure Philanthropies?" Prof. G. E. Holden, Des Moines, who spoke on "The Relation Between Business and Policies," and Woodworth Clum, Davenport, whose subject was "The State of Iowa."

Mr. Guernsey said that the present marked an important stage in the growth of public utilities in Iowa. The time had been when one could invest in a public utility just the same as in any other business enterprise, but that was not the attitude of the public to-day. Its present attitude was that a public utility should not have more than a fair living profit, should stand all losses and turn over any gains to the public. This condition could not last indefinitely. The time was soon coming when the investor might expect as much in return from a public utility as from any other business. The present growth of public utilities had been retarded on account of restrictions. Money was a commodity and would go to the markets where it could get the biggest returns. Unfortunately, the laws of the State were in the hands of politicians who were incompetent to regulate public utilities. What could be done to better the existing conditions? The first thing was to ascertain what the plants are worth, not the first cost but the present physical value including the overhead and going values. The last two items were real and must be included. More than one-half of the public utility corporations did not know the actual worth of their properties or of the cost of doing business. A detailed statement of actual values would determine

where economies could be made. A fair return should at least take care of depreciation and leave not less than 10 per cent profit. The investors must not be blamed for putting money in other classes of business because all the public utility corporation had to offer was a fair return which might be taken away at the end of the franchise life. When the franchise expired the city had the right to erect a plant, to take it away or to establish competition. If the actual value of the public utility has been ascertained, it is in position to educate the public. Only after the public has been educated will the public utilities be able to secure the compensation to which they are entitled. It should be understood that when the public adds hazard to business it must pay for the increased cost of service. Regulation was good for all, but it must be taken away from the politicians and put into the hands of fair-minded commissions whose members have enough business knowledge to give fair decisions.

ELECTRICAL SHOW

The annual electrical show was opened at the Coliseum, Des Moines, on Tuesday, April 23, with about fifty exhibits.

MEETING OF JOINT COMMITTEE ON MULTIPLE UNIT OPERATION

The meeting of the joint committee on multiple unit operation of the Engineering Association and of the Transportation & Traffic Association was held at the offices of the association, Thirty-ninth Street, April 25 and 26. Those present representing the Engineering Association were H. H. Adams, New York, co-chairman, and H. C. Benedict, Newark, N. J. Those representing the Transportation & Traffic Association were W. H. Sawyer, New York, co-chairman; R. A. Crume, Dayton, Ohio, and M. B. Kilbride, Rochester, N. Y. F. E. Case, of the General Electric Company, and M. B. Lambert and Clarence Renshaw, of the Westinghouse Company, were also in attendance by invitation of the committee.

Since the appointment of the committee, the co-chairmen, Messrs. Sawyer and Adams, have been engaged in preparing data to facilitate the study of the different operating units covering single-car, two-motor car and trailer operation which the committee plans to study. These types were described in detail on page 164 of the issue of the Electric Railway Journal for Jan. 27 and are to be considered from the standpoints of both city and interurban operation on the basis of (1) actual cost of operation under the different conditions outlined and (2) the general desirability of the different types of equipment. To facilitate the work of the committee, the co-chairmen had prepared a series of tables showing the equipment required for each type of operating unit, together with the investments involved and the maintenance costs and inspection. Most of the session on Thursday morning was devoted to a discussion by the members of the committee and the representatives of the manufacturers present upon the statistics compiled and the exactness of the weights and prices quoted.

Through the courtesy of Mr. Danforth, of the Public Service Railway, Alexander Jackson, of the department of timetables and schedules of that company, had prepared a report upon the practical effect on assignments to runs of motormen and conductors when two-car trains were run during rush hours and single cars at other times during the day. A typical timetable of this kind was submitted by Mr. Jackson to the committee based on the operation of fifty two-car trains during the rush hours on a headway of one minute, with a service graduated down for other hours to a headway of four minutes per single car. According to Mr. Jackson, as may be expected, two-car operation shows several points of advantage over conditions when single cars only are used. Observations were also presented of the time required to pass a two-car train across the congested corner of Market Street and Broad Street, Newark, N. J.

The discussion on Thursday afternoon was devoted to the relative maintenance costs of the various types of car bodies, trucks, electrical equipment and air brakes, together with the costs of lubrication and inspection, which would exist under each one of the various combinations to be assumed. The estimated costs of maintenance for the different units, which had been made up by the co-chairmen, were gone over with the closest detail by the committee as a whole and final figures which would represent a reasonable average for the whole country were decided upon.

On Friday morning the matter of energy consumption was taken up. The effect of the large number of variables which enter into this phase of the problem was discussed, and an effort was made to determine an average of the relative amounts of energy that would be required (1) for a single car with two motors, (2) for a single car with four motors, (3) for a two-car train of two motor cars, (4) for a two-car train consisting of a motor-car and trailer where the motors are large enough so that the trailer may be hauled as an all-day load, and (5) for the same train but with the motors of such capacity only as would be required if the trailer was hauled simply during rush hours. Interest and depreciation on these various combinations of equipment, and the percentage of cars which would normally be held out of service for wrecks and repairs, were considered, and average figures were determined.

In the afternoon the committee took up the financial questions connected with these different types of cars and trains, as well as their traffic-handling ability and their relative safety of operation.

COMMITTEE ON ELECTRICITY A. R. E. A.

The American Railway Engineering Association has appointed the following committee on electricity: George W. Kittredge, New York Central & Hudson River Railroad, chairman; J. B. Austin, Jr., Long Island Railroad, vice-chairman; D. J. Brumley, Illinois Central Railroad; R. D. Coombs, consulting engineer; A. O. Cunningham, Wabash Railroad; L. C. Fritch, Chicago Great Western Railroad; George Gibbs, Pennsylvania Tunnel & Terminal; G. A. Harwood, E. B. Katté and C. E. Lindsay, New York Central & Hudson River Railroad; W. S. Murray, New York, New Haven & Hartford Railroad; Frank Rhea, commercial engineer; J. R. Savage, Long Island Railroad; Martin Schreiber, Public Service Railway; W. I. Trench, Baltimore & Ohio, and H. U. Wallace, consulting engineer.

The work which the committee is to undertake is (1) to continue the consideration of the subject of clearances; (2) to report on the effect of electrolytic action on metallic structures and the best means of preventing it, and (3) to continue the preparation of a standard specification for overhead transmission-line crossings. The report presented by this committee at the last meeting of the American Railway Engineering Association was published on page 461 of the Electric Railway Journal for March 23, 1912.

As an example of the constant effort toward the replacement of wood with steel construction it is interesting to note that the Bessemer & Lake Erie Railroad Company has ordered 100 50-ton all-steel box cars. These cars are made with ¼-in steel plate floors and 5/16-in. plate girder side sills. The end sheets are ¼-in. and the side sheets 3/16-in. steel plates for half the height of the car and the rest of these sheets and the roof are made of ⅛-in. plates. The general appearance of the cars is not abnormal. In fact, they resemble the standard wooden freight car except for a slightly smoother and more symmetrical outline.

COMMUNICATIONS

CALCULATION OF RESISTANCE AND RATE OF ACCELERATION

Richmond, Va., April 15, 1912.

To the Editors:

If a car is to be built to weigh, say, 30 tons, including electrical equipment of four GE-80 60-hp motors with K-28-B control, how could the resistance be calculated with such exactness that there would be an easy start on the first point, and so that the arcing when the controller passed from the first point to the off point would be reduced to a minimum? Another problem which the writer would like to have solved is the following:

If a car with certain low-speed gear ratio accelerated smoothly on level track and even up a 15 per cent grade at 500 volts, would not the acceleration be poorer if the gear ratio was changed for higher speed and the other conditions remained the same? Would the wheels tend to spin more because the higher speed equipment required a larger starting current and hence less external resistance? Why is it that the higher speed equipment requires a larger starting current and must have a finer rheostatic adjustment to reduce the spinning tendency to the minimum?

James L. Crane.

The answers to Mr. Crane's questions follow herewith:

The total amount of grid resistance for use with the equipment and weight of car specified would depend on the initial acceleration desired. An acceleration of 1.5 m.p.h. per second is a common figure used for ordinary service conditions. A tractive effort of 100 lb. per ton is needed to produce an acceleration of 1 m.p.h. per second. Hence there must be $1.5 \times 100 \times 30$, or 4500, lb. net tractive effort for a 30-ton car. The train resistance for the slow speed of starting will be about 20 lb. per ton, or 600 lb. for a 30-ton car. The total tractive effort developed by the motors in starting must therefore be $4500+600=5100$ lb., or 1275 lb. per motor for a four-motor equipment. By referring to a characteristic curve for a GE-80 motor with 4.73 gear ratio and 33-in. wheels, it will be seen that this required tractive effort is produced when each motor is taking 62 amp. With the motors connected in pairs with two motors permanently in parallel, as would be the case with a K-28-B controller, the total car current would be 124 amp. By Ohm's law the line potential of 500 volts divided by this current would give 4.03 ohms as the total resistance of the circuit. The resistance of four GE-80 motors connected as above is 0.574 ohm, and if the resistance of the car wiring and inductive effect is 1.4 ohms, this would leave 2.056 ohms as the value of the grid resistance. Several methods are employed by designers for computing the values of the various resistance steps after the total resistance has been determined. One of these methods will be given in connection with an article on resistance to be published later.

A car with the weight and equipment just mentioned will have a maximum speed of about 24 m.p.h. on a level track. If this gear ratio should be changed from 4.73 to 3.53, the maximum speed will be increased to 30 m.p.h. If the accelerating current remains the same, the average acceleration will decrease from 1.5 m.p.h. per second to 0.93 m.p.h. per second, due to the decreased tractive effort with the same current at the lower gear ratio. If it is desired to keep the average acceleration the same, then the accelerating current must be increased from 62 amp to 82 amp per motor, to give the same tractive effort in each case. The rate of acceleration is limited by the weight on the driving wheels. Under ordinary track conditions, if the tractive effort developed is more than one-fifth of this weight, the wheels will slip. Thus in the case in question the tractive effort should not be over 3000 lb. per motor. With the equipment as specified, the motors would have to be very much overloaded to slip the wheels. A careful study of the characteristic curves for the motors used on any equipment will show how a change in gear ratio will affect the speed, acceleration and tractive effort.

MANUFACTURING IN REPAIR SHOPS

Lord Manufacturing Company.
Brooklyn, N. Y., April 23, 1912.

To the Editors:

We want to compliment you upon the editorial which appears on page 609 under the heading "Manufacturing in Repair Shops." It is a most timely and well-put statement of facts. The manufacturer oftentimes is placed at a very great disadvantage by reason of the railway company's neglect to consider overhead charges and many other incidentals, such as non-productive labor.

A few years ago it was very much the practice for electric railway companies, especially large companies, to build their own cars, but they have proved now to their own satisfaction that they can purchase cars from the manufacturer to far better advantage.

When M. K. Bowen was president and general manager of the Chicago City Railway, that company operated a very large car factory in connection with its shops, but after a few years of manufacturing its own cars the company decided that it would be better to purchase from those who made a specialty of car manufacture. Now it is the rule to purchase cars complete and the exception not to do so.

All manufacturers of reputation and experience are specialists in their line. This is an age of specialists, and they are more expert in their particular lines than the operator who must, of necessity, generalize. This is as true on electric railways as in law or medicine, and railway companies are rapidly coming to the point where they realize that it is cheaper for them to look only after the upkeep and operation of their properties and that they should depend upon the manufacturer for the particular items of articles of which he is the producer and on which he should be an expert. Such an understanding will add to the healthy growth in revenue to the railway and the manufacturer.

Lord Manufacturing Company.
By W. R. Garton.

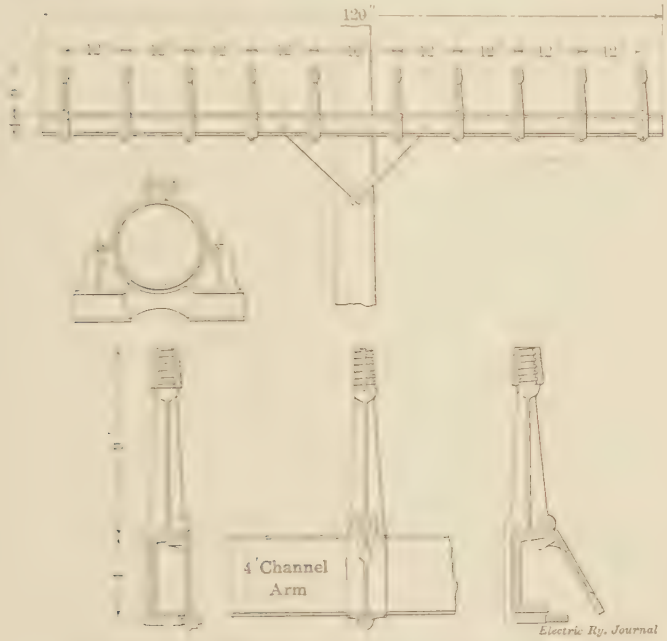
WEED KILLER FOR ELECTRIC RAILWAYS

To the operator of electric railways on private right-of-way or unpaved highways the approach of warm weather means heavy expense to keep the track free from the weeds and fungi which not only impede traffic but also prevent satisfactory drainage. Various methods of burning off weeds have been tried from time to time, but a simpler means is afforded by the use of a fungicide which will kill all vegetable and fungus growths without injuring the ties or rails in any way. A liquid which is asserted to embody this quality is the "Target Brand" weed killer made by the Horticultural Chemical Company, Philadelphia, Pa. This compound is so highly concentrated that a mixture of 1 gal. weed killer with 40 gal. of water will kill all forms of vegetation to the root. One gallon thus diluted will cover 100 sq. yd. to 150 sq. yd., or one barrel mixed with forty barrels of water will cover 1 mile of single track at a cost of material not exceeding $25. The solution is sprinkled by means of any simple form of tank car. One application is considered sufficient for a season. The manufacturer states that the best time for applying this compound is just after rain, as the liquid is then absorbed by the roots before it is taken up by the soil

METAL CROSS-ARMS AND PINS

The St. Louis Malleable Casting Company, St. Louis, Mo., is bringing out a complete line of metal cross-arms and metal pins for all kinds of service from telephone and telegraph to high-tension transmissions. The cross-arm will be a standard commercial channel with a 4-in. web and 1⅝-in. flanges, tapered on the inside from ⅛ in. to 5/16 in., weighing 5¼ lb. per foot and punched as required. A second cross-arm, weighing only 4¼ lb. per foot, with a tensile strength eighteen times greater than wooden arms, will also be available. If still greater economy is desired, a special channel arm will be bent from cold steel plate 3/16 in. thick. These arms will be galvanized for ¾ cent per pound, and a complete arm with its set of pins will be double-dipped with "Rabok" graphite rust and heatproof paint for 3 cents. In general, it is stated that these metal cross-arms and pin outfits will weigh less than wood and prove more durable.

Of the several designs offered, the type "K" equipment will prove most interesting to electric railways, because it is adapted for both high-tension and low-tension work. The most striking feature of the pin is the hinged construc-



Metal Pole Fittings for High-Tension Service

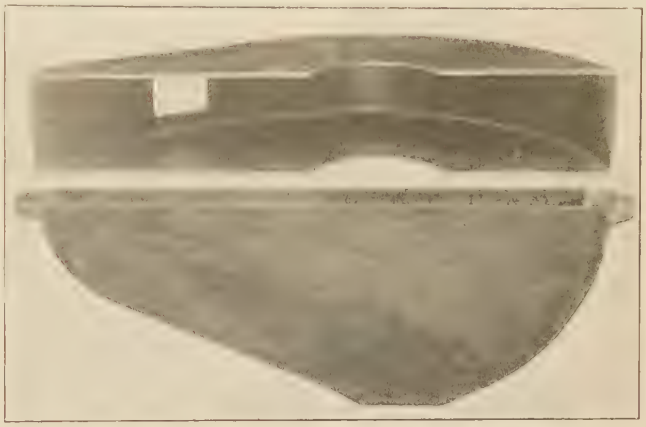
tion which permits it to be attached to channel, angle, "T" or other metal arms without drilling any holes in the arms. As shown in the accompanying drawing, an inward projection on the hinge wedges against the taper of the cross-arm flange and so draws the pin up tightly against all four sides of the arm, even when the nut on the bottom is screwed but halfway with the fingers. A hammer blow on the outer side of the hinge makes it easier to turn up the nut. The natural spring of the bottom of the hinge casting acts as an effective nut lock.

For low-tension work the type "K" pins will be sold for less than 4 cents each; furthermore, there are only two pieces to assemble, namely, the pin and its nut. For high-tension work these pins will be furnished for less than the old-style malleable pins with steel studs extending through wooden arms. Insulation for high-tension work can be provided at an additional cost of 2½ cents for each 10-ft. arm by placing a 1⅝-in. x 1-in. wooden strip on the top of the arm.

The type "K" arm and pin are used in connection with the metal chair and clamp illustrated for clamping to 2-in. to 7-in. iron poles. The arm is prevented from dropping from the chair because, even though the bolts are loose, the chair supports both the side and the bottom of the arm. The arm cannot slip down on the pole, even if the nuts on the bolts are turned up with the fingers. The set for a 6-in. pole weighs 5 lb. and costs about 25 cents. It is asserted that the combination of this clamp, type "K" pin and channel cross-arm makes a feeder arm which at half the cost is much stronger than the present designs of feeder arms.

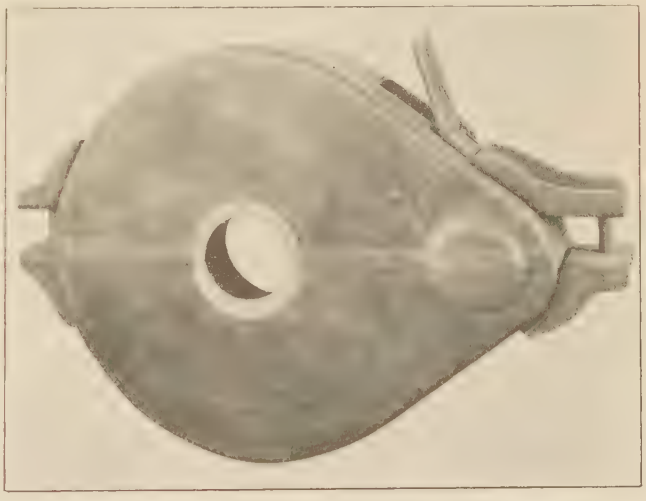
SEAMLESS AND WELDLESS SHEET-STEEL GEAR CASE

A striking innovation in American gear case practice is the seamless and weldless sheet-steel design which has just been placed on the American market by Rudolph Chillingworth, Nürnberg, Germany. Although this gear case has been in use on European street railways for ten years, the high tariff on manufactured steel products made



Halves of Seamless and Weldless Gear Case

it impracticable to sell a foreign-made product in this country. Now that a few sample cases have been successfully tried out, however, by some American lines, Mr. Chillingworth has established a factory at Jersey City, N. J. The advantages of sheet-steel gear cases, especially from the standpoints of lightness and ease of repair, are too well known to require explanation. The Chillingworth method is considered to mark another step forward in the manufacture of such cases because each half with its correspond-



Seamless and Weldless Gear Case Complete

ing brackets is drawn from a single piece of sheet steel. Consequently, this case is free from the large number of rivets, welds and overlaps which are common to built-up cases. Two great advantages of the single-piece construction are that the lubricant is retained in the case and that injurious substances cannot enter, as there are no seams which are liable to open from vibration in service. These gear cases are made for any type of suspension desired and for any specified truck and motor clearances.

News of Electric Railways

National Civic Federation to Consider Extent of Public Service Legislation

Following a meeting on April 13, 1912, of the executive council of the department on regulation of interstate and municipal utilities of the National Civic Federation it was announced that John H. Gray, professor of economics in the University of Minnesota, is in active charge of the investigation to be conducted by a committee of the federation to determine how far regulation of public utilities, including steam and electric railroads and electric and water power companies, may go without interfering unduly with management. The history, status, methods and results of control of public service corporations in the United States will also be compared with the methods employed in England in regulating quasi-public corporations. For this purpose a detailed investigation will be made of corporation regulation in England.

Prof. Bruce Wyman, of the Harvard Law School, has been appointed counsel for the investigation. Other experts who have been employed are William D. Kerr, formerly of the Wisconsin Railroad Commission, and I. L. Scharfman, of the Boston bar. A compilation of all the public service laws of the United States (federal and state), Great Britain, the Dominion of Canada and the Canadian provinces has been undertaken by the federation. The committee will probably include in the investigation some of the typical instances of local utilities under the control of local commissions, such as the street railways in Chicago and the public utilities in Kansas City, St. Louis, Toronto and Los Angeles.

The executive committee which was appointed last June by the federation with power to determine the method and scope of the investigation consists of Emerson McMillin, chairman; Franklin Q. Brown, Martin S. Decker, Franklin K. Lane, Blewett Lee, Milo R. Maltbie, P. H. Morrissey, Leo S. Rowe and John H. Gray, secretary.

Terms Suggested to Govern Improvements at Boston

Prof. Bruce Wyman, of the Harvard Law School, is reported to have prepared at the solicitation of Governor Foss of Massachusetts a plan to meet the offer of the New York, New Haven & Hartford Railroad to the effect that upon a properly approved scheme it would spend $100,000,000 in improvements at Boston. Under the plans of Prof. Wyman the North Station would be sunk underground; a tunnel would be bored under Atlantic Avenue; the South Station would become the city's sole above-ground passenger terminal; the Boston bridges on the Charles River would, with the exception of the Charlestown bridge, be done away with and a new four-level underground station would be established at State Street. Involved in this plan is the dissolution of the Boston Holding Company, the leasing of the Boston & Maine Railroad to the New York, New Haven & Hartford Railroad for twenty-five years, with a prospect of eventual consolidation, and the electrification of the lines in the metropolitan district within five years. The Boston *Post* quotes Prof. Wyman in part as follows:

"The first step is the construction of a tunnel under Boston to unite the railroads which enter Boston from the south with those which enter Boston from the north. The railroads from the south have been brought into the South terminal, which is one of the great railway stations of the world. On the north, within our own time also, the trains have been brought into the North Station, which we all agree to be at best a temporary structure. A four-track tunnel between the two stations would bring about the concentration of our railroad terminals. Plainly the North Station is the site for an urban station. In tunneling under Boston, undoubtedly there would be another station midway between the two stations, probably at State Street, under the present so-called Atlantic Avenue station of the East Boston tube. In this way Boston passengers would have the choice of at least three stations for their arrival and departure, while in crossing the city no changes would be necessary.

"In order to connect all railroad transportation lines the scheme of development should include a tunnel to East Boston. This would take care only of the eastern division in a satisfactory way. But it would also handle the Revere Beach business and probably the eastern division trains. From the point of view of freight handling this is indispensable, as our greatest railroad dockage has been developed upon the East Boston waterfront. It is also clear that the through tunnel should go beyond the present site of the North Station under the Charles River with its northern portal in the Boston & Maine Railroad yards in Charlestown. Whatever legislation there is should provide for this and for the removal from the Charles River of the piling with which the railroad bridges now encumber it.

"The legislation of 1912 should provide in a comprehensive way for the settlement of the whole transportation problem. The Legislature should insist that the Albany road be electrified at least as far out as Riverside at the same time. The South Station should be free of steam engines and the Exeter Street yards, which now divide the Back Bay district, should be in some way eliminated. Provision should also be made for the standardization of the Revere Beach road and for the bringing of it into Boston by the East Boston branch of the railroad tunnel. Who knows but the Grand Trunk will come in by the same route? The legislation should provide for this contingency."

Governor Foss sent a special message to the Legislature on April 24, 1912, recommending the consolidation of the Boston & Maine Railroad and the New York, New Haven & Hartford Railroad, a tunnel under Boston to connect the two systems and electrification of the lines within a radius of from 10 to 15 miles of the heart of Boston. The message also recommends that a public utilities commission be established in place of present Railroad Commission and Gas and Electric Light Commission. An outline of the proposed bill was printed in the Electric Railway Journal of April 13, 1912, page 631.

The Street Railway a Benefactor

W. A. House, president of the United Railways & Electric Company, Baltimore, Md., has referred as follows in the annual report of the company just issued to the part played by the street railway as a public benefactor:

"There are some people who do not appreciate the benefit the United Railways & Electric Company is to Baltimore and the counties. Many do not take the trouble to familiarize themselves with public affairs or are indifferent regarding such matters. They look on the street railway company as a corporation actuated solely by selfish motives. They forget that a corporation represents an aggregation of units—that the word practically means co-operation, and that co-operation is the keynote to success. Very few people realize the difficulties of modern street railway operation. When tie-ups or blockades occur the company is often condemned, although the resulting detentions may be beyond its control. When everything is working smoothly and there is comparative freedom from delays, no mention is made of the fact, because it is what the people expect. The aim of the company is to give as perfect service as is practicable, and it believes that the major portion of the people is reasonable in its expectations. Counting the transfers, people step up and down from its cars over one million and a quarter times a day. The cars pass over the system mainly through the crowded streets, covering nearly 79,000 miles, or over three times the circumference of the globe, in a single day.

"A street railway is dependent for its existence upon the good will of the people of the particular community in which it is operated. To a large percentage of the residents of a city the means of travel about the city and into the suburbs, such as are afforded by a modern street railway, are essential to the commercial and social life of the citizens. There is a community of interest between the people of a city and its street railway company. A few people have not yet been able to overcome the idea that the street railway company, because a corporation, is in-

capable of any good purpose and altogether indifferent to the wishes and convenience of the riding public. Criticism of service applies more particularly to the rush hour period, when the complaint is that the cars are overcrowded. They are and they will probably always be so. This is one of the most complex problems, and a daily one, that confronts the managers of a street railway system, and it would seem to be almost impossible of solution so long as everybody wants to go in the same direction at the same time."

New York Transfer Bill Vetoed by Governor

Brief mention was made in the Electric Railway Journal of April 20, 1912, page 669, of the hearing before Governor Dix at Albany, N. Y., on April 16, 1912, in regard to the Stilwell-Goldberg bill passed by the Legislature to require the street railways which operate in the borough of Manhattan to comply at once with the order of the Public Service Commission of the First District directing the companies to restore transfers at more than 150 points at which they were discontinued following the receivership and the segregation of the several properties. On April 19, 1912, the Governor vetoed the bill, saying in part:

"The object of this bill is to confirm by legislative enactment an order heretofore granted by the Public Service Commission which is being litigated. If the order shall be upheld by the courts the proposed legislation will be thus proved unnecessary. On the other hand, if the courts should decide that the order is neither just nor reasonable I cannot admit the propriety and justice of compelling by legislative enactment what would have been forbidden by the court if the litigation should not have been summarily ended by statute. I am accordingly of opinion that any legislation in this matter should at least await the judicial determination which is under way."

The final order for the restoration of transfers at 151 points was issued on Dec. 5, 1911. The companies obtained writs of certiorari for review of all the proceedings and the entire matter is now before the courts.

Bill to Create Utility Commission in Washington Amended

Senator Gallinger, chairman of the Senate District committee, has reported back to the Senate, with a recommendation that it pass, the bill to create a public service commission to supervise the operation of the public service corporations in the District of Columbia. As now recommended by the committee the bill will provide that "every public utility doing business in the District of Columbia having tracks, conduits, subways, poles, wires, switchboards, exchanges, works or other equipment shall, for a reasonable compensation, permit the use of the same by any other public utility whenever public convenience and necessity require such use," etc. The provision that in case the corporations in question cannot agree in regard to the necessity for joint use, or the compensation to be paid for joint use, the commission shall decide is retained.

An amendment adopted gives the commission power not only to compel public utility corporations to comply with this proposed law and municipal regulations but also to compel them to comply "with all other laws of the United States applicable." This will enable the committee to enforce provisions of the general laws for the regulation of interstate commerce. The physical valuation of the properties of the public utilities is provided for.

The section regarding the depreciation account has been redrafted. The committee has added to the list of things which it is to investigate upon complaint or upon its own initiative "time and conditions of payment," so that it is specified that "upon its own initiative or upon reasonable complaint made against any public utility that any of the rates, tolls, charges or schedules or services or time and conditions of payment, or any joint rate or rates, schedules or services, are in any respect unreasonable or unjustly discriminatory" the commission is to make an investigation.

The provision about the ownership of stock or bonds of one public utility corporation by another has been redrafted to prohibit the acquiring of either stock or bonds of one company by another, except on the written authority of the commission. The committee decided to extend from 90 to 120 days the length of time within which appeals from orders of the commission must be taken to the courts. The bill originally had given the commission power to extend the ninety-day period, but that authority is denied to the commission as the bill is redrafted. The redrafted bill is more stringent in regulating the issue of stocks, bonds and other liabilities.

Schedules at Cleveland

At the first meeting of the board of arbitration chosen to decide whether the new schedule insisted upon by the city of Cleveland for the Superior Avenue line is practicable J. J. Stanley, president of the company, suggested that an extra car be put into regular service on the line at an expense of $6 per day for motorman and conductor. This car, he believed, would result in lengthening the layovers three minutes and would relieve the situation somewhat when cars are late. Mayor Newton D. Baker and Street Railway Commissioner Witt accepted the suggestion, and the board of arbitration adjourned until May 16, 1912, to await the result of the trial of this plan, which was to be put in operation on April 22, 1912.

Before this suggestion was made Mayor Baker stated that he felt some agreement could be reached without resort to the machinery of the franchise. If the arbitrators should find it necessary to meet again they will decide whether schedules may be properly made a subject of arbitration.

Early in the week F. H. Goff, president of the Cleveland Trust Company and representative of the Cleveland Electric Railway during the Johnson negotiations, expressed his willingness to act as the third member of the board of arbitration.

The directors of the Cleveland Railway took no action at their meeting on April 20, 1912, in regard to the operating deficit, which now aggregates about $95,000. On April 18, 1912, city officials announced that they would not oppose an increase in the fare when the interest fund becomes less than $300,000. On March 1, 1912, the fund amounted to $367,000, having decreased from $700,000 on June 1, 1911. It is estimated that a charge of 1 cent for each transfer will have to be made later to bring the fund up to $700,000 again.

The monthly statement of the company for March, 1912, shows a book surplus of practically $25,000, a deficit of about $25,000 in the operating fund and a surplus of $18,000 in the maintenance fund.

Indiana Railroad Commission to Visit Rail Plants.—Arrangements were made at the close of the second hearing in regard to steel rails before the Indiana Railroad Commission on April 15, 1912, for the members of the commission to visit the plants of the Illinois Steel Company at Chicago and the Indiana Steel Company at Gary to investigate the manufacture of rails.

Terms for Settlement of Differences Between City and Company in San Francisco.—Thornwell Mullally, assistant to the president of the United Railroads, San Francisco, Cal., has addressed to the public utilities committee of the Board of Supervisors a letter in which he has outlined terms for the settlement of all questions at issue between the city and the company in regard to the operation of the Geary Street Municipal Railroad.

Bill to Create Public Service Commission Passed in Rhode Island.—Governor Pothier of Rhode Island has signed the bill passed by the Legislature to create a commission to supervise the public service corporations which operate in Rhode Island. The measure was introduced into the Legislature in February, 1912, and a brief digest of the provisions of the bill was published in the Electric Railway Journal of March 9, 1912. The measure as finally passed differs somewhat from the one originally introduced.

Opinion in Regard to Illinois Employers' Liability Law.—In an opinion handed down on April 22, 1912, the Illinois Supreme Court holds that under the 1909 health, safety and comfort act it is mandatory upon employers to provide safeguards against dangers and hazards in all industrial plants; that notification by the state factory inspection department

of the need of installing safety devices is not necessary, and that in case of violation of this act an employer is liable not only for damages in the sum fixed by a jury but also for the penalty prescribed for violation of the law.

Toronto Applies for Municipal Ownership Rights.—The city of Toronto, Ont., has given notice that it intends to apply to the Ontario Legislature for an act to authorize the city to assume the ownership and possession of the Toronto & York Radial Railway running from Sunnyside Crossing, Toronto, to a point at or near Long Branch Park, in the township of Etobicoke. The city intends to extend this line in an easterly direction along the Lake Shore Road and Queen Street, in Toronto, so as to connect with the tracks of the Toronto Railway.

Supplementary Reports on San Francisco.—B. J. Arnold has submitted to the Board of Supervisors of San Francisco two additional preliminary reports, one relating to tunnels into Harbor View, the other to the location of the outer terminal of the Geary Street Municipal Railroad. Mr. Arnold believes that little time should be wasted before commencing the construction of a tunnel for street railway traffic from the business sections to the Harbor View bridge. The tunnel will also include a sidewalk. It is recommended that the Geary Street Municipal Railroad should be extended on Balboa Street and Cabrillo Street to the beach at Golden Gate Park.

Increase in Tax Values in Kentucky.—The State Board of Valuation and Assessment of Kentucky has announced that a general increase in the assessments of the franchises of public service corporations is to be made. Some of the increases which have already been announced include those of the Louisville Railway from $6,800,270 to $13,900,000, and the Covington Railway from $710,373 to $5,000,000. In this connection it is reported that Governor McCreary plans to call a special session of the Legislature to consider the adoption of a bill to create a public service commission. The Legislature at its regular session defeated a measure of this kind, which was introduced at the instance of the administration.

Fenders in New Orleans.—The committee of the City Council of New Orleans, La., which is considering the question of a suitable fender for use on the cars operated in that city by the New Orleans Railway & Light Company has not adopted any policy of opposition to fenders as compared with life guards, as might have been inferred from a note in this column in the issue of April 13, 1912. It is seeking only to secure the best protective device. About 150 letters from manufacturers or inventors of fenders and wheel guards have been submitted to the company. The company will make selections from among these devices and submit them to the Council for acceptance about June 1, 1912.

Progress of Valuation Work in Chicago.—James J. Reynolds, of the valuation committee which is preparing a report on the physical value of the property of the elevated railways operated in Chicago in connection with the proposed plan for the unification of the surface and the elevated railways, is reported to have said on April 17, 1912: "We checked this afternoon a number of items and got our own and the company's figures compared. Where there is a difference the experts of both sides are making comparisons to see what causes the differences of opinion. It will be impossible to make an estimate of the time it will take to go over the whole situation, but we intend to finish it and make our report to the local transportation committee of the City Council."

Proposed Elevated Railway Improvements in New York.—A statement was submitted on April 22, 1912, to the Public Service Commission of the First District of New York relative to proposed improvements at stations on the Manhattan Elevated Railway, which is operated by the Interborough Rapid Transit Company. The company is willing to consent to such improvements pending the conclusion of the subway negotiations, and particularly of the question of third-tracking and extending the elevated lines on a comprehensive scale. The more extensive improvements that are under consideration may cost $1,500,000. To a large extent the work would consist in widening the ends of platforms, which have been increased in length from time to time as the length of the trains has been increased.

Bill to Fix the Hours of Labor of Canadian Employees.—Sir James Whitney, Premier of Ontario, has introduced an amendment to the bill to give the Ontario Railway & Municipal Board power to fix the hours that street railway employees are to be required to work. The bill as originally drafted referred to motormen, conductors and other employees, whereas the amendment would confine the act to motormen and conductors. The bill provides that in no case shall these employees be required to work more than six days a week and ten hours a day, the said ten hours' work to be completed within twelve consecutive hours as "far as practicable." His reason for inserting the words "as far as practicable" was because he had come to the conclusion that any direct provision in the statutes in regard to the number of consecutive hours would embarrass the companies if they should be called upon to meet an extraordinary emergency. In any cases about which there might be a question as to the ability of the company to arrange to have the men complete their daily task within twelve hours the matter could be referred to the Ontario Railway & Municipal Board.

Tax Returns in Indiana.—Figures compiled from reports filed by the electric railways of Indiana with the State Board of Tax Commissioners for assessment purposes show that only 7.42 miles of track were built in Indiana during 1911 and that only 0.2 mile of this was second main track. These figures do not include the returns of electric railway partially built in 1911 and completed in 1912. The Indianapolis & Cincinnati Traction Company reported an increase of 46.25 miles in main track, due to taking over the property of the Indianapolis & Southeastern Traction Company, a line previously built and operating between Indianapolis, Shelbyville and Greensburg. The St. Joseph Valley Traction Company reported the largest increase in main track, but this was only 7 miles. The Terre Haute, Indianapolis & Eastern Traction Company reported a decrease in net earnings from $233,222 for 1910 to $210,642 for 1911. The gross earnings of the Indiana Union Company were $2,295,797 for 1911, as compared with $2,364,627 for 1910. The Indianapolis, Crawfordsville & Western Traction Company, which has been operated by a receiver for more than a year, reported an increase in net earnings of about $4,400.

Steinway Tunnel Established as Rapid Transit Route.—The Public Service Commission for the First District of New York has completed the legalization of the Steinway tunnel rapid transit route, which will be part of the dual system of subways in Greater New York. The Steinway tunnel was built by a private company controlled by Interborough Rapid Transit Company interests. It runs from Forty-second Street and Fourth Avenue, Manhattan, through Forty-second Street and under the East River to Long Island City. The tunnel is said to have cost between $7,000,000 and $8,000,000, but the Interborough Rapid Transit Company proposes to turn it in to the city at $3,000,000 as a part of the extended subway which is to be operated by that company. To do this it was necessary for the commission to establish it as a rapid transit route under the law. This was done by action of the Public Service Commission and the Board of Estimate and Apportionment. It was also necessary to get the consents of a majority of property owners along the route, and this has now been done through the action of the New York Central & Hudson River Railroad, which owns property in Forty-second Street and which has formally consented to the new route.

PROGRAMS OF ASSOCIATION MEETINGS

Street Railway Association of the State of New York

At a meeting of the executive committee of the Street Railway Association of the State of New York at the Hotel Utica, Utica, N. Y., on April 18, 1912, it was decided to hold the annual convention of the association at Saratoga Springs, N. Y., June 26 and 27.

Arkansas Association of Public Utility Operators

The Arkansas Association of Public Utility Operators will hold its fifth annual meeting at Little Rock, Ark., on May 20, 21 and 22.

Financial and Corporate

Stock and Money Markets

April 24, 1912.

The rather abrupt forward movement on Tuesday of the prices of securities traded in on the New York Stock Exchange was checked to-day. There was also a considerable change in activities. Except for Reading and a few others the representative market leaders were traded in only to a very limited extent. The speculative issues were prominent, however, and twenty-seven new high records for the year were recorded in the specialties. Rates in the money market were: Call, 2½@3 per cent; sixty days, 3½@3¾ per cent; ninety days, 4@4½ per cent.

In the Philadelphia market trading was well distributed, with bonds in fair demand. No issue in particular featured and the price changes which were recorded were only small fractions.

In the Chicago market activity was centered largely in the industrials. The bond market was dull.

In the Boston market trading in the industrials and rails was quiet. On the whole the Boston market was devoid of interesting features.

In the Baltimore market United Railways funding 5's were strong and rose two points.

Quotations of traction and manufacturing securities as compared with last week follow:

	April 17.	April 24.
American Brake Shoe & Foundry (common)	a96½	a95½
American Brake Shoe & Foundry (preferred)	a134½	a118¼
American Cities Company (common)	33½	*33½
American Cities Company (preferred)	82½	*82½
American Light & Traction Company (common)	a305	a305
American Light & Traction Company (preferred)	a109	a109
American Railways Company	a44	a44
Aurora, Elgin & Chicago Railroad (common)	43¾	a50
Aurora, Elgin & Chicago Railroad (preferred)	a86¾	a88
Boston Elevated Railway	a130	a129
Boston Suburban Electric Companies (common)	a15	a15
Boston Suburban Electric Companies (preferred)	a81¼	a81¼
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a50	a50
Brooklyn Rapid Transit Company	83	83⅜
Capital Traction Company, Washington	125	125
Chicago City Railway	a190	a190
Chicago Elevated Railways (common)	a40	a40½
Chicago Elevated Railways (preferred)	a94	a94
Chicago Railways, ptcptg., ctf. 1	a96	a100
Chicago Railways, ptcptg., ctf. 2	a36	a34
Chicago Railways, ptcptg., ctf. 3	a95⅝	a10[illegible]
Chicago Railways, ptcptg., ctf. 4	a5½	a6
Cincinnati Street Railway	a131	a131
[illegible]	[illegible]	[illegible]
Cleveland, Southwestern & Columbus Ry. (common)	*4¾	*4¾
Cleveland, Southwestern & Columbus Ry. (preferred)	32	*32
Columbus Railway & Light Company	a55	a55
Columbus Railway (common)	80	80
Columbus Railway (preferred)	a94	a94
Dayton Street Railway (common)	a25	a25
Dayton Street Railway (preferred)	a100	a100
Denver & Northwestern Railway	135	*135
Detroit United Railway	a70	a70
General Electric Company	170¼	170
Georgia Railway & Electric Company (common)	a126	a128
Georgia Railway & Electric Company (preferred)	a86¼	a86½
Interborough Metropolitan Company (common)	19⅝	20
Interborough Metropolitan Company (preferred)	58¾	58½
International Traction Co. 4% bonds, rcts.	75	*75
Indiana Union Traction Company	7	7
Kansas City Railway & Light Company (common)	a20	a20
Kansas City Railway & Light Company (preferred)	a50	a50
Lake Shore Electric Railway (common)	8	8
Lake Shore Electric Railway (1st preferred)	91	91
Lake Shore Electric Railway (2d preferred)	24	24
Manhattan Railway	a137	a137½
Massachusetts Electric Companies (common)	a21	a21
Massachusetts Electric Companies (preferred)	a95½	a95½
Milwaukee Electric Railway & Light (preferred)	*105	*105
Norfolk Railway & Light Company	27	*27
North American Company	83¾	a84½
Northern Ohio Light & Traction Company (common)	a75	a75
Northern Ohio Light & Traction Company (preferred)	a110	a110
Philadelphia Company, Pittsburgh (preferred)	a53¼	a53
Philadelphia Company, Pittsburgh (common)	a44	a44
Philadelphia Rapid Transit Company	a23⅛	a23
Portland Railway, Light & Power Company	68½	*68½
Public Service Corporation	a111	a111
Third Avenue Railway, New York	37⅞	a40
Toledo Railways & Light Company	a15	9¾
Twin City Rapid Transit Co., Minneapolis (common)	a106	a106¼
United Rys. & Electric Company (Baltimore)	*20½	*20½
United Rys. Inv. Co. (common)	33¾	34⅝
United Rys. Inv. Co. (preferred)	62½	63⅜
Virginia Railway & Power Company (common)	a48	a48½
Virginia Railway & Power Company (preferred)	88	88
Washington Ry. & Electric Company (common)	82¾	*82¾
Washington Ry. & Electric Company (preferred)	a95	*95
West End Street Railway, Boston (common)	a84½	a85
West End Street Railway, Boston (preferred)	a101½	a101½
Westinghouse Elec. & Mfg. Co.	75¼	77
Westinghouse Elec. & Mfg. Co. (1st preferred)	a122½	a122½

* Last sale. a Asked.

ANNUAL REPORTS

United Railways & Electric Company of Baltimore.

The income account of the United Railways & Electric Company of Baltimore for the year ended Dec. 31, 1911, follows:

Gross earnings		$8,025,758
Operating expenses:		
Conducting transportation	$1,590,959	
Motive power	590,528	
Maintenance of way	330,921	
Maintenance of cars	426,925	
General expenses	741,760	
Total operating expenses		3,681,093
Net earnings		$4,344,665
Ratio of operating expenses—45.87 per cent.		
Income from other sources		2,640
Total net income		$4,347,305
Fixed charges, etc.:		
Interest on bonds	$2,095,775	
Park and other taxes	725,559	
Ground rents and other rentals	8,052	
Interest on car trust certificates, series "A"	6,563	
Interest on car trust certificates, series "B"	15,937	
Interest on car trust certificates, series "C"	7,800	
Total fixed charges, etc		2,859,686
Balance		$1,487,619
Deduction from income—rental account, 1½ per cent sinking fund, Maryland Electric Railways Co. 5 per cent bonds		60,000
		$1,427,619
Amount written off for extraordinary expenditures, subject, however, to final distribution by the board of directors		450,944
		$976,675
Interest on income bonds and dividends on preferred stock		560,000
Balance for the year carried to the credit of profit and loss account		$416,675

William A. House, the president, says in his report in part:

"Comparing 1911 results with those of 1910, we have the following: Increase in gross earnings, $337,863, or 4.39 per cent; increase in operating expenses, $79,197, or 2.20 per cent; increase in fixed charges, $58,050, or 2.07 per cent; increase in amount carried to credit of profit and loss for the year, $53,869, after deducting $60,000, representing 1½ per cent sinking fund on the $4,000,000 Maryland Electric Railways 5 per cent bonds for the year, and $560,000 interest on income bonds and dividends on preferred stock.

"The increase in fixed charges is due to increase in park tax, the additional obligations incurred for rentals on property leased from the Maryland Electric Railways and interest on increased number of funding bonds.

"The percentage of operating expenses to gross earnings was 45.87 per cent, as compared with 46.85 in 1910, a decrease of 0.98 per cent.

"The average earnings per car mile were 27.97 cents, an increase of 0.43 cent (due to increased efficiency resulting from large expenditures upon the property), and the cost of service 12.83 cents (exclusive of taxes and rehabilitation charges), a decrease of 0.07 cent.

"The number of car miles run was 28,698,339, an increase of 786,766 miles.

"The total number of revenue passengers carried was 161,467,727, an increase of 6,538,942.

"The number of transfers used was 64,643,636, an increase of 3,853,829, about 40 per cent of the paying passengers having availed of the transfer privilege.

"The policy pursued since the great fire of charging to an account designated as 'extraordinary expenditures' the amounts required for rehabilitating the property was continued. There was taken from income $450,944, which was credited to extraordinary expenditures and put into the property.

"Attention is called to the fact that $330,920 was spent for maintenance of way and $426,925 for maintenance of equipment (as against $287,033 and $413,724 respectively during 1910) in addition to the $450,944 extraordinary expenditures above recited, or a total of $1,208,789.

"Current assets as of Dec. 31, 1911, were $899,434 in excess of current liabilities; accounts payable were decreased $22,428, and cash on hand increased $58,806.

"There was expended $373,557 in 1911 under the arrangement with the Maryland Electric Railways for purchase, construction, etc., of property leased to your company.

"There was in the hands of the trustee, as of Dec. 31, 1911, out of the proceeds of the sale of Maryland Electric Railways 5 per cent bonds $114,277, which is available for the acquisition of additional property.

"In the twelfth annual report for the year ended Dec. 31, 1910, reference was made to the fact that your company was indorser of $450,000 of Baltimore, Sparrow's Point & Chesapeake Railway notes, representing part of the original construction cost of that property, and of $100,000 notes of the Baltimore, Halethorpe & Elkridge Railway, representing the total original construction of the latter road. At that time these notes were held by several banks. Prior to Dec. 31, 1911, however, your company had taken over from the banks $150,000 and $100,000 of these notes respectively, and now holds them in its treasury.

"For the purpose of providing funds for the payment of the $2,000,000 first mortgage 5 per cent bonds of the Baltimore City Passenger Railway and the $500,000 4½ per cent certificates of indebtedness of the same company, both of which matured Nov. 2, 1911, and for redeeming the outstanding $535,000 car trust certificates, series 'B' and 'C,' your company issued on July 15 $3,125,000 three-year 5 per cent collateral trust convertible coupon notes in denominations of $100, $500 and $1,000. These notes are redeemable at par and interest on sixty days' notice, but the holders under the conversion privilege have the right at any time up to and including Jan. 2, 1914, on five days' notice, to convert the principal of each note into shares of the common stock of the company at $25 per share, provided they have not been theretofore redeemed.

"By the payment of the bonds of the Baltimore City Passenger Railway the first consolidated 4 per cent bonds of your company became a first lien on all the railway lines, property, etc., of the old Baltimore City Passenger Railway and are now a first lien on 182 miles out of a total of 403.6 miles operated, as well as on the Carroll Park car and machine shops, the Pratt Street boiler house and equipment, No. 2 engine house and the Hartford Road, Eastern Avenue and Nunnery Lane substations.

"On June 1 the payment of interest in cash on the income bonds and dividends on the preferred stock was resumed. Under the financial plan of 1906 the coupons of the income bonds were funded up to and including Dec. 1, 1910, in the 5 per cent funding bonds of the company. As has been stated in previous reports, payments on these obligations were suspended after the destruction of property by the great fire of 1904, which materially decreased receipts. For seven years practically the entire surplus earnings after payment of interest on the first consolidated 4's and underlying bonds were applied to the rehabilitation of the property.

"The total amount of taxes and public charges, including park tax, cost of paving streets, track changes necessitated by regrading of streets and highways, sewerage commission work, widening of streets, etc., was $828,382, an increase of $15,708, or about 10 1/3 per cent of the gross revenue of your company and 19 per cent of the net receipts after paying the costs of operation. In other words, the total amount of taxes and other public charges paid by your company represents the gross earnings of about one in every ten cars operated, and the total net earnings (after paying costs of operation only) of about one car in every five.

"The park tax for the year was $515,741, as against $495,960 in 1910, an increase of $19,780.

"The federal excise tax amounted to $0,055 for the year.

"Your company now operates 403.64 miles of single track, of which 170.86 miles are laid with T-rail, mainly on suburban lines; 1.38 miles with duplex rail; 188.04 miles with 9-in. girder rail, and 43.36 miles with various small girder sections.

"During the years 1905 to 1911, inclusive, your company's track structures were affected to the extent of 52.4 miles of single track by the combined operations of the city engineer's department, the county commissioners, the State Roads Commission, commissioners for opening streets and the sewerage commission.

"During the year a large amount of special work was fabricated at the company's shops. Heretofore this character of work has been purchased, principally from outside manufacturers. It is estimated, basing calculations on prices asked by the manufacturers and what it has cost to perform the work by the company's forces, that a saving of 37 per cent has been effected, the wearing qualities and workmanship being equal, if not superior, to that purchased of the steel manufacturers.

"On Feb. 8, 1911, an agreement was entered into between your company and the Pennsylvania Water & Power Company, covering the furnishing by the latter company of hydroelectric energy. The agreement runs for a period of fifteen years, with the right reserved to your company to terminate it at the end of either five or ten years. Under this contract the power company began furnishing current on July 17, forty-five days prior to the date stipulated in the contract, due to rapid progress made in the installation of necessary apparatus by the two companies. The service has been uninterrupted except on a few occasions for short periods, principally due to lightning. An improved system of lightning arresters has been installed, which it is believed will reduce these interruptions to the power service to a minimum.

"Without in any way disturbing or changing the contract of Feb. 8, an arrangement was subsequently concluded with the Pennsylvania Water & Power Company, under which on Oct. 25 the power company began furnishing your company additional energy, designated as 'supplementary current,' between 1 and 10 p. m., during the highest evening peak, this arrangement to be terminable upon forty-eight hours' notice by either company to the other. Operations at the Pratt Street plant have not been entirely discontinued, but the river power is utilized in conjunction with the steam-generated power at Pratt Street, this latter station being always available as a reserve plant in any emergency that may arise.

"During the year fifteen old cars were sold, to net $4,135. Since the substitution of the semi-convertible air brake cars for the smaller cars 185 of the latter have been sold, to net $81,540.

"Under the arrangement with the Maryland Electric Railways, a tract of land on the southeast side of the Harford Road, about 220 feet northeast of the eastern boundary of the city, containing 3.33 acres, has been acquired, on which it is proposed to erect a modern carhouse for the accommodation of cars operating in that section. The plans for the proposed structure are now in course of preparation.

"In line with the company's policy to increase the pay-as-you-enter service on its system, twenty-five of the large double-truck semi-convertible cars of the Calvert-St. Paul Streets line were remodeled at the company's shops to adapt them to this method of operation and placed in service on Dec. 10. Three of your company's lines are now equipped with this type of car.

"Effective Jan. 1, 1912, in conformity with a requirement of the Public Service Commission a new classification of accounts was adopted, following closely the classification of the Interstate Commerce Commission and that of the American Electric Railway Accountants' Association.

"In anticipation of the extraordinary demands that will be made upon it during the coming summer, especially at the time of the holding of the Democratic national convention, the company has ordered sixty large double-truck semi-convertible cars, to be delivered in time for service during the convention."

British Columbia Electric Railway, Ltd.

The annual report of the British Columbia Electric Railway, Ltd., for the fiscal year ending June 30, 1911, shows that 46,541,448 passengers were carried, an increase over the preceding year of 12,064,644. The net earnings, partly estimated, including income from holdings in subsidiary companies and the sale of land, but before providing for renewals or maintenance, were £481,042, compared with £379,129 for the preceding year. After deducting £25,000 for estimated London charges and capital amortization charge and £135,457 for interest on bonds and debentures £323,585 was left for renewals, dividends, etc. The annual dividend rate since 1908 has been 8 per cent. On Dec. 31, 1911, the company was operating over 232 miles of electric railways, had 644,888 lamps connected with its lighting system and 1554

consumers for industrial power. On Jan. 16 the company offered for subscription at 96 in London £800,000 4¼ per cent perpetual guaranteed debenture stock of the Vancouver Power Company, Ltd., guaranteed unconditionally as to principal and interest by the British Columbia Electric Railway Company, Ltd. This issue is made principally to provide for increased generating capacity by erecting a higher dam and extending the power plant at Lake Coquitlam and enlarging the distributing system.

Chicago Railways Company

The statement of income of the Chicago Railways Company for the year ended Jan. 31, 1912, with a comparison with the previous year, follows:

Year Ended Jan. 31.	1912.	1911.
Income from:		
Passengers	$16,737,408	$13,715,672
Chartered cars	4,698	4,234
Mail	37,809	37,867
Advertising	100,000	64,355
Rent of land and buildings	14,054	42,390
Rent of equipment	15,205	31,302
Sale of power	120,090	39,659
Interest on deposits	51,737	41,785
Miscellaneous income	75,494	87,435
Gross income	$17,156,495	$14,064,709
Expenses:		
Maintenance way and structures	$747,581	$486,738
Maintenance equipment	868,278	727,280
Renewals	1,381,178	*70,519
Operation of power plants	1,771,302	1,616,496
Operation of cars	4,643,183	4,453,830
General expenses	1,820,280	1,919,265
Investment real estate expense	25,909	48,800
Taxes	855,391	663,406
Total expenses	$12,113,102	$9,845,296
Balance	$5,043,393	$4,219,413
Deduct interest at 5 per cent on valuation	3,549,018	2,865,531
Net income	$1,494,375	$1,353,882
Division on net income:		
City of Chicago, 55 per cent	$821,906	$744,635
Chicago Railways Company, 45 per cent	672,469	609,247
Items of income:		
The company's proportion of income from joint operation	672,469	609,247
Interest allowance on valuation of property	3,549,018	2,865,531
Interest on bank balances	125,877	52,907
Interest on treasury securities	54,042	233,953
Interest on bonds and collateral notes not issued	25,785	28,128
Miscellaneous income	2,457	26,341
Gross income	$4,429,648	$3,816,107
Deductions:		
Interest accrued on		
First mortgage bonds	$2,180,267	$1,466,925
Consolidated mortgage bonds	1,218,792	1,190,300
Collateral and funding notes	396,900	396,900
Purchase money mortgage bonds	162,920	13,577
Current liabilities	1,144	61,271
Sinking fund reserve accrued	250,000	250,000
Corporate expenses and adjustments	118,401	163,884
Total deductions	$4,328,424	$3,542,857
Net income	$101,224	$273,250

*Credit

Traffic statistics for the two years compare as follows:

Car mileage:	1912	1911
Passenger cars	57,208,131	51,424,606
Mail cars	196,074	221,822
Total	57,404,205	51,646,428
Passengers carried:		
Revenue	334,769,338	276,750,953
Free	3,765,506	4,147,736
Transfer	239,589,482	207,591,415
Total	578,124,326	488,490,104
Percentage of revenue and free passengers using transfers	70.77	73.90
Percentage of operating expenses to gross income	57.56	65.78
Percentage of renewals to gross income	8.05	*0.50
Percentage of taxes to gross income	4.99	4.72
	70.60	70.00
Percentage of interest on plant value to gross income	20.69	20.37
Percentage of net divisible income to gross income	8.71	9.63
	100.00	100.00

*Credit

General Electric Company

The annual report of the General Electric Company for the year ended Dec. 31, 1911, shows the following comparison with the previous year:

	1911	1910
Sales billed	$70,383,854	$71,478,557
Cost of sales	62,460,557	63,134,601
Profit from sales	$7,923,297	$8,343,956
Interest and discount, royalties and sundry profits	1,358,859	1,370,928
	$9,282,156	$9,714,884
Interest on debenture bonds	371,015	717,395
	$8,911,141	$8,997,489
Income from securities owned, profit on sales of securities and net appreciation of stocks and bonds	1,651,664	1,858,203
Net profit for the year	$10,562,805	$10,855,692
Dividends paid	5,806,344	5,214,368
Surplus for the year	$4,756,461	$5,641,324

C. A. Coffin, the president, says in part in his statement to stockholders:

"The cost of sales includes, as in prior years, the cost and expenses of development, manufacturing, selling, administration and patents, and also depreciation in factory plants and book accounts.

"The above figures do not include the business of the Fort Wayne Electric Works and Sprague Electric Company. On June 1, 1911, your company took title to the properties of the Fort Wayne and Sprague companies. Those companies have been dissolved, and their assets and liabilities are included in the balance sheet accompanying this report. These changes have resulted in the addition of $1,517,335 to the assets of your company, $276,610 to its liabilities and $1,240,725 to its surplus. To the surplus for the year, $4,756,461, must, therefore, be added the surplus taken over from the Fort Wayne and Sprague companies, $1,240,725, a total increase of $5,997,186. The surplus at Jan. 1, 1911, was $23,022,705. The surplus at Dec. 31, 1911, was $29,019,892.

"The orders received in 1911 compare with those of 1910, on the same basis, as follows:

	1911	1910
Number of orders	388,520	338,272
Amount	$69,851,275	$71,182,391
Unfilled orders at Dec. 31	$15,200,000	$15,500,000

"Substantial increases in the sales departments were made during the year to place these departments in a position to exploit thoroughly the steadily increasing variety of electrical appliances manufactured by your company and to provide for the growth in number and complexity of orders received. This has resulted in increased selling expenses, which have been still further augmented as a result of the severe competition in nearly every branch of the business. The tonnage output of the factories was greater than in the previous year, but, due to reduction in selling prices, the sales billed were less.

"The area of manufacturing floor space and the number of employees in all departments in 1911 were approximately as follows: Manufacturing floor space, square feet, 9,770,000; employees, 41,300. The figures include floor space of 880,000 sq. ft. in the Erie, Fort Wayne and Sprague Works and also employees of the commercial and administrative departments.

"The land areas of the several plants is as follows: Schenectady, 336 acres; Lynn, 185 acres; Pittsfield, 64 acres; lamp works, 14 acres; Erie, 300 acres; Fort Wayne, 13 acres; Sprague, 9 acres; total, 921 acres.

"During the year $769,842 was expended for the purchase of sundry patents, for applications and licenses under patents, patent litigation and miscellaneous expenses, all of which has been charged to profit and loss as heretofore, leaving the patent account at $1.

"Certain securities have been acquired and others sold, and all the stocks and bonds owned by your company have been carefully re-valued, with the result that at Dec. 31, 1911, their par value of $27,264,086 was carried on the books at $28,707,843.

"The copper-mining investment has been written off against surplus.

"On Dec. 31, 1911, the book value of current accounts and notes receivable was $19,084,105 after allowances for losses and adjustments. Of the accounts receivable, the total face value of unsettled accounts originating prior to Jan. 1, 1911, was $871,514. In addition, there was due from affiliated manufacturing and selling companies $2,891,760, making a total book value of all notes and accounts receivable of $21,975,866.

"Merchandise inventories have been valued on the same conservative basis as in prior years.

"On Jan. 31, 1893, the book value of the Schenectady, Lynn and Harrison plants was $3,958,528. During the nineteen fiscal years to Dec. 31, 1911, expenditures have been made, including the cost of acquiring the Pittsfield plant, aggregating $46,212,476. This makes a total of $50,171,004. There was written off during the nineteen years the sum of $33,297,949, leaving the book value of these plants at Dec. 31, 1911, $16,873,055. To the above have been added the value of the new plant under construction at Erie (the property of the Pennsylvania General Electric Company having been transferred to your company) and the values of the Fort Wayne and Sprague Works. Including these, the book value of factory plants, at Dec. 31, 1911, was as follows: Schenectady, $9,125,720.24; Lynn, $4,283,763.29; Pittsfield, $2,148,699.46; lamp works, $1,314,871.82; Erie, $1,355,834.28; Fort Wayne, $938,102.37; Sprague, $371,930.34; total, $19,538,921.80.

"The company has no note payable nor is there any paper outstanding bearing its indorsement.

"The action brought by the United States against your company and others in connection with the manufacture and sale of incandescent lamps has been terminated by the entry of a decree. In compliance with this decree, the National Electric Lamp Company and its subsidiary companies, operating under patent licenses granted by the General Electric Company, will immediately be dissolved. The plants and properties of these companies will be taken over and operated by the General Electric Company as part of its organization.

"It is believed that the business of your company, in all of its various branches, is now being conducted in such a manner as to avoid any possible ground for criticism as contravening the anti-trust law."

Coney Island & Brooklyn Railroad, Brooklyn, N. Y.—It was announced on April 23, 1912, that the 12,000 shares of the 30,000 shares of stock of the Coney Island & Brooklyn Railroad taken over recently from the estate of the late Henry B. Hyde at $75 a share, together with stock obtained since that time by George H. Prentiss & Company, New York, N. Y., have been turned over to the Lawyers' Title Insurance & Trust Company, New York, N. Y., as trustee, which company has assumed the title to the stock. The only statement which has been issued in this connection is to the effect that the transfer of the title is a banking transaction. George H. Prentiss, of the firm of George H. Prentiss & Company, is a director of the Coney Island & Brooklyn Railroad, and the offer which his firm made to other stockholders following the purchase of the securities owned by the Hyde estate was referred to in the Electric Railway Journal of March 16, 1912, page 439.

Electric Bond & Share Company, New York, N. Y.—The financial statement of the Electric Bond & Share Company as of Dec. 31, 1911, follows: Assets—cash on hand and in banks, $895,598; accounts receivable, $51,160; notes receivable, $989,265; accrued interest receivable, $60,748; syndicate holdings, underwritings and advances, $1,049,401; stocks, $2,966,631; bonds and coupon notes, $781,455; total, $6,794,260. Liabilities—accounts payable, $12,100; dividends on preferred stock due Feb. 1, 1912, $20,000; syndicate and contingent liabilities, $347,536; reserves, $100,400; outstanding preferred stock, $2,000,000; outstanding common stock, $2,000,000; surplus and undivided profits, $2,314,233; total, $6,794,260.

Illinois Traction System, Champaign, Ill.—The St. Louis, Springfield & Peoria Railroad, which is controlled by the Illinois Traction System, has filed with the Secretary of State a certificate of an increase in the capital stock of the company from $6,050,000 to $7,850,000.

Manistee Light & Traction Company, Manistee, Mich.—The property of the Manistee Light & Traction Company was sold under foreclosure recently. This is the second time the property has been sold under foreclosure. At the original sale, which was held on May 6, 1911, the property was purchased by a representative of the New England Trust Company, Boston, Mass., trustee, acting for the bondholders, but the sale was never confirmed. Day & Zimmerman, New York, N. Y., are now having an expert examination made of the property.

New Hampshire Electric Railways, Haverhill, Mass.—The property of the Portsmouth & Exeter Street Railway was sold under foreclosure on April 22, 1912, to S. M. Russell, Haverhill, who intends to dismantle the road. As stated in the Electric Railway Journal of Nov. 11, 1911, page 1042, masters appointed by the court found that the road could not be made to pay.

North Jersey Rapid Transit Company, Paterson, N. J.—Henry H. Parmelee has been appointed receiver of the North Jersey Rapid Transit Company by Vice-Chancellor Stevenson upon the application of William B. Gourley, representing the Hamilton Trust Company, Paterson, trustee for the bondholders of the North Jersey Rapid Transit Company. The interest due on Nov. 1, 1911, on the bonds of the company is in default.

Public Service Railway, Newark, N. J.—The Camden & Suburban Railway, which is controlled by the Public Service Railway, has sold to Bioren & Company, Philadelphia, Pa., $250,000 of first mortgage 5 per cent gold bonds due July 1, 1946, to retire the $250,000 of 5 per cent bonds of the Camden Horse Railroad due on May 1, 1912.

Quebec Eastern Railway, Quebec, Que.—Rodolphe Forget and J. N. Greenshields, directors of the Quebec Railway, Light, Heat & Power Company, Ltd., have concluded negotiations for the purchase of the property of the Lotbinière & Megantic Railway and the charter and rights of the Quebec Eastern Railway, which was recently incorporated. The Lotbinière & Megantic Railway is a steam railroad 30 miles long and the plan of the purchasers is to incorporate the road as part of a projected through electric railway from Sherbrooke to Quebec.

Tennessee Railway, Light & Power Company, Nashville, Tenn.—The Tennessee Railway, Light & Power Company was incorporated in Maine on April 23, 1912, to control the Nashville Railway & Light Company, Chattanooga Railway & Light Company, the Tennessee Power Company and the Cleveland (Tenn.) Electric Light Company, as mentioned in the Electric Railway Journal of April 13, 1912, page 633.

Dividends Declared

East St. Louis & Suburban Railway, East St. Louis, Ill., quarterly, 1¼ per cent, preferred.

Hartford & Springfield Street Railway, Warehouse Point, Conn., 2 per cent, preferred.

Lincoln (Neb.) Traction Company, quarterly, 1½ per cent, preferred.

Pensacola (Fla.) Electric Company, 3 per cent, preferred.

Tampa (Fla.) Electric Company, quarterly, 2½ per cent.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, quarterly, 1¼ per cent, preferred.

West Penn Railways, Pittsburgh, Pa., quarterly, 1¼ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

EAST ST. LOUIS & SUBURBAN RAILWAY

Period			Gross Earnings.	Operating Expenses.	Net Earnings.	Fixed Charges.	Net Surplus.
1m.,	Mar.,	'12	$201,018	$104,030	$96,988	.....	.....
1 "	"	'11	176,892	98,543	78,349	.....	.....
3 "	"	'12	577,863	306,368	271,495	.....	.....
[illegible]			[illegible]	[illegible]	[illegible]		

GALVESTON-HOUSTON ELECTRIC COMPANY.

1 m.,	Feb.	'12	$136,445	$88,356	$48,087	$34,437	$13,752
1 "	"	'11	99,929	70,974	28,954	19,578	9,377

JACKSONVILLE TRACTION COMPANY.

1m.,	Feb.	'12	$45,912	$31,130	$14,782	$9,463	$5,319
1 "	"	'11	46,973	30,267	16,706	6,919	9,787

NORTHERN TEXAS ELECTRIC COMPANY.

1m.,	Feb.	'12	$113,488	$67,839	$45,649	$20,846	$24,804
1 "	"	'11	109,088	64,243	44,845	20,488	24,358

PADUCAH TRACTION & LIGHT COMPANY.

1m.,	Feb.	'12	$23,930	$16,486	$7,444	$7,058	$614
1 "	"	'11	20,728	12,[illegible]	8,337	6,591	1,747

PENSACOLA ELECTRIC COMPANY.

1m.,	Feb.	'12	$23,015	$14,077	$8,938	$6,377	$2,561
1 "	"	'11	23,320	14,259	8,062	4,938	3,124

PUGET SOUND ELECTRIC RAILWAY.

1m.,	Feb.,	'12	$128,734	$106,228	$22,506	$37,223	$14,717
1 "	"	'11	132,135	114,044	18,091	41,708	23,618

Traffic and Transportation

Application of Mileage, Excursion and Commutation Tickets for Through Transportation

The Interstate Commerce Commission in a report which it rendered recently interprets as follows the law in respect to the application and use of mileage, excursion and commutation tickets for through transportation in connection with other lawfully established fares:

"1. It is lawful for a carrier or carriers having duly established in the manner required or authorized by law any form of excursion, commutation or mileage fares to provide in their schedules for the use of any of said fares as basing fares, thus enabling other carriers to use the same, in connection with their own duly established fares, for the through transportation of passengers on any physical line of connecting carriers, upon a combination of tickets over all of the component parts of such through line, and for the carriers composing or operating such through line to afford through sleeping car, baggage checking and other through accommodations in the same manner as in case of through tickets over the entire line, provided the passenger demanding such through transportation and through accommodations shall present to the initial carrier at the point of starting the lawfully authorized tickets covering the lines necessary for the entire through journey. It, however, is not deemed lawful for a carrier to check a passenger's baggage beyond the point to which he presents tickets at the point of starting, upon the mere declaration of intention to go farther upon another ticket to be thereafter purchased, or otherwise.

"2. Upon duly established tariff authority therefor the initial carrier may issue to a passenger a through ticket for the sum of two or more duly established fares applicable over the several connecting roads composing the through physical line from the starting point to destination, or may issue additional or separate ticket or tickets at lawful tariff fares therefor, which, in connection with the ticket or tickets already held by the passenger, will cover the entire journey that the passenger desires to take.

"3. In order that unjust discrimination may be avoided it is necessary, to the end that tickets of the kind above referred to may be made available for the purposes specified and in the manner indicated, that definite and specific provision therefor be contained in established tariff schedules which are filed with this commission and also in the tariff schedules that contain the excursion, commutation or mileage fares that are to be so used. When tariffs contain such provisions the combination so authorized may be used in lieu of the regular joint or local fares between the points covered by the combination."

Rules for Employees by an Employee

The success of the efforts of the Louisville & Northern Railway & Lighting Company and its associated company, the Louisville & Southern Indiana Traction Company, to reduce accidents has been due largely to the cooperation of the men in charge of its cars. Quarterly meetings of the trainmen are held, and at these meetings the subject of safety of operation and accident reduction is gone into thoroughly. One of the results has been that many suggestions offered by the men have been adopted by the management. R. B. Kent, one of the employees of the Indianapolis & Louisville Traction Company, a connecting line, has contributed the following rules, which have been printed and distributed among the employees of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company:

"Do not allow yourself to think that you have any 'rights' at that street or alley intersection, but always think of the worst possible thing for you that the other fellow can do, and then think that he may do it. If you always do this, there is not much likelihood of your being responsible for that smashed wagon or broken head.

"No matter how late you may be, if you approach or are about to run through a switch which appears to be half-cocked or slightly out of alignment, get off your car and examine it. Someone may have split it.

"Out on interurban track, when snow is on the ground, always be sure that the switch has been properly swept out, and in closing it remember that the next man may approach at high speed and leave the rails if it gapes ever so little.

"Do not leave your controller, when stopped to receive and discharge passengers. People are frequently hurt by cars which start rolling, and if you are at your proper place, you will know that it didn't move an inch.

"It is often said regarding rules, 'Anyone can sit at a desk and dope out rules.' Bear in mind that the man who sits at the desk is a sifter of facts, and after he has properly sorted his facts he arrives at a definite conclusion which he proceeds to put into effect in a rule, and that every rule is based on operating practice, often covering years, and representing the best thought of those foremost in traction matters, and that the rule is the mathematical result of investigation rather than a reflection on you or a desire to hamper you.

"Always be courteous to the passengers, to the bystander and the man who pulls across in front of you with the wagon. Remember that the person you 'call' or 'tell it to' to-day may be the one person who can save you and the company after that next accident.

"Let your watchword be, 'Eternal vigilance.'

"Examine your car each time you take a siding and at other times when practicable. A little thing like a lost cotter pin from the brake rigging may cause you to overrun that next derail.

"Never tell a boisterous passenger what you will do unless you are prepared to do it. He may make you show him, and some other passenger may get hurt during the fracas. Be firm, do not get angry yourself, and the chances are that he will become tractable.

"Never forget the fact when things go wrong and you think that you are not getting a square deal, and that the company fails to appreciate your services, that the company has already shown its appreciation by intrusting you with from $10,000 to $15,000 worth of equipment and with the lives of a number of people who rely on you and on the company absolutely for safe transportation. So forget the heroics, get down to business, be a booster for your road and 'keep smiling.'"

Special Recognition for Wives of Portland (Ore.) Employees

B. S. Josselyn, president of the Portland Railway, Light & Power Company, Portland, Ore., addressed a communication on April 11, 1912, in part as follows, to the employees who have been with the car service department of the company more than five years and who are designated as gold-stripe platform men:

"Ever mindful of the power for good that resides in the personnel of our oldest employees in the car service department and being particularly mindful of the important part taken in our work by the wives of our employees, the company desires to recognize in a substantial manner the women who toil early and late in order that their husbands may have an early breakfast and a refreshing dinner after a day of long, hard toil. We have 255 platform men in our employ who have been in our service five years or over, known as 'gold-stripe men.' Of this number thirty-one are single men, six widowers and two hundred and eighteen married, a showing which testifies to the sobriety and permanent citizenship of our oldest employees. The company will mail to each wife and to the single men or widowers in this class a purchase order amounting to $10, which can be used anywhere in Portland or St. Johns in such manner as the recipient desires, such purchase orders to be accepted as cash by the railway company upon demand. These purchase orders will be mailed in April to those who report at Piedmont and Sellwood carhouses and in May to those who report to Ankeny and Savier Street carhouses, this division being made so that all the purchase orders will not have to be redeemed in any one calendar month. Wishing you, your wives, children and sweethearts a happy, contented and prosperous year, I remain."

Two years ago Mr. Josselyn arranged to give each platform man who had been with the company five years or more a new uniform.

Use of Trail Cars in Milwaukee Considered.—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., is considering the use of trail cars during the summer to meet extraordinary traffic demands.

Collision on the Detroit, Jackson & Chicago Railway.—Two cars on the Detroit, Jackson & Chicago Railway, which were scheduled to meet at Dexter, collided 7 miles west of Ann Arbor, Mich., on the afternoon of April 15. Two persons were killed and forty others were injured.

Rerouting Cars in Newport, Ky.—The officials of the South Covington & Cincinnati Street Railway, Covington, Ky., are preparing to reroute cars in conformity to the changes that are being made by the Cincinnati Traction Company and the changes that are under way on the I. & N. bridge across the Ohio River. It is probable that some of the cars may be routed over the central bridge.

Reduction in Fare Between Newark and New York.—The fare over the Hudson & Manhattan Railroad from Newark, N. J., eastward, to points along Sixth Avenue, New York, has been reduced 5 cents. By the new arrangement passengers from Newark change at Grove Street, Jersey City, ride uptown in New York to any point as far north as the Pennsylvania Railroad station at Thirty-third Street, and upon leaving the train pay an extra fare of 2 cents. It has been announced that as soon as a working plan can be devised the reduced rate westward will be put into effect.

Terms of Freight Grants Decided Upon in Los Angeles.—The Board of Public Utilities of Los Angeles, Cal., has decided that for freight and express carrying privileges through the streets of Los Angeles the local street railways shall pay the city annually 2 per cent of the gross receipts from the freight and express service. It was also decided that franchises for freight-carrying privileges in the industrial district of the city shall be granted for twenty-one years. The express-carrying permits are to apply to all lines within the city, but are to be revocable at will. Freight and express are not to be transported during the rush hours.

Interurban Terminal Question in Cincinnati, Ohio.—At the request of Mayor Hunt, of Cincinnati, Ohio, City Solicitor Bettman has written a letter to William Cooper Proctor, chairman of the committee on interurban terminal, in which he says that the idea of bringing the cars of the interurban railways into Cincinnati so as to secure rapid transit to the suburbs presupposes that there must be terminals. He suggests that the committee consider first the most economical and practical location for the terminal and then investigate the canal which has been leased from the State for boulevard and subway purposes and learn what roads may use it economically.

Traffic Order by Maryland Commission.—The question of the operation of the cars of the United Railways & Electric Company, Baltimore, Md., to Howard Park, Woodlawn and West Arlington has been settled by the Public Service Commission of Maryland requiring the company to operate the cars of the West Forest Park branch through Woodlawn via Garrison Avenue and to terminate its West Arlington branch at Gwynn Oak Junction. This order was issued after the commission had required an accurate record to be kept of the traffic on these lines passing through Gwynn Oak Junction, which showed that 70 per cent of the patrons used the West Forest Park branch.

Rehearing Denied in Regard to Reduction in Bridge Fare in New York.—The Public Service Commission of the First District of New York has denied an application of the Bridge Operating Company for a rehearing on the commission's recent order requiring the company, which operates local cars on the Williamsburg Bridge, to sell a single-fare ticket for 2 cents and three tickets for 5 cents. The company, which has a contract with the city to provide the local bridge service, had been charging 3 cents for a single fare and selling two tickets for 5 cents. The application for a rehearing was based on the ground that the commission has no power to change rates of fare agreed upon by contract between the city and the company.

Owl Service in Hamilton, Ont.—The city officials of Hamilton, Ont., have requested the Hamilton Street Railway, which is controlled by the Dominion Power & Transmission Company, Ltd., to charge only a 5-cent fare on cars until midnight instead of the 10-cent fare now in effect after 11:30 p. m. The by-law under which the company obtained the right to charge a double fare on the late trip was passed in 1900. At that time the company informed the city that it had received many requests from citizens to run late cars to meet the Grand Trunk Railway trains, and agreed to give a late service if permitted to charge a 10-cent fare. In March, 1900, the Council passed a by-law consenting to a double fare on cars after 11:30 p.m. or before 5:30 a.m. The company says that the late cars do not pay even with the 10-cent fare.

Traffic Departments of Oregon Roads Merged.—The traffic department of the Mount Hood Railway & Power Company has been merged with that of the Portland Railway, Light & Power Company, Portland, Ore., and placed under the supervision of the various officials of the Portland Railway, Light & Power Company. F. D. Hunt, traffic manager of the Portland Railway, Light & Power Company, will have charge of the traffic of the entire system. C. J. Franklin, general superintendent of the railway department of the Portland Railway, Light & Power Company, will have charge of transportation on both systems, and Thomas Pumfrey will have charge of tracks, bridges and buildings. The other officers of the Mount Hood Railway & Power Company will be merged with those of the Portland Railway, Light & Power Company on May 1.

Station Facilities in Lockport.—The Public Service Commission of the Second District of New York has served upon the Buffalo, Lockport & Rochester Railway the complaint of the Board of Trade of Lockport asking that that company be required to provide a waiting room in the vicinity of Main and Market Streets in Lockport. The company states that, inasmuch as it bears a portion of the expense of maintenance of the Lockport station of the International Railway and runs its cars into that station, it would seem unnecessary that two waiting rooms or stations should be provided in a city of the size of Lockport. The answer also states that inasmuch as the cars always leave Lockport for points east on schedule time, there is no reason why passengers should be obliged to wait upon street corners for any appreciable length of time. A hearing will be appointed upon this matter in the near future.

Reduction in Fare Asked Between Lockport and North Tonawanda.—The Public Service Commission of the Second District of New York has received a petition from the Mayor and Common Council of the city of Lockport asking for a reduction in the fare charged by the International Railway between Lockport and Payne's Avenue Junction in North Tonawanda, a distance of approximately 14 miles. The petition states that the company issues commutation books for use between these stations for $6.90 and that books for travel between Buffalo and Martinsville, a stopping place in the extreme easterly end of North Tonawanda, a distance of 15 miles, are sold for $5; that at the stopping place known as Payne's Avenue Junction there is a large manufacturing plant which employs many workmen who reside in Lockport, and that the charge exacted by the company is an unjust discrimination against them and other users of commutation books between these stations.

Report of Interborough Rapid Transit Company's Relief Department.—The voluntary relief department of the Interborough Rapid Transit Company, New York, N. Y., was organized on Feb. 1, 1907. A general statement covering the year ended Feb. 1, 1912, and a statement of cash receipts and disbursements since Feb. 1, 1907, have been issued. The total membership on Dec. 31, 1910, was 5776, whereas on Dec. 31, 1911, it was 6202, an increase of 426 for the year. During 1911 the medical examiners made 5031 calls on disabled members and examined for admission to fund 2730 applicants. The operating expenses from organization to Dec. 31, 1911, paid by the company amounted to $81,932. Seventy-seven death claims were paid during 1911, amounting to $35,770. There are forty-two members who have been disabled more than one year and are drawing half-rate benefits. The statement of receipts and disbursements from Feb. 1, 1907, to Dec. 31, 1911, inclusive, shows the following principal items: Total receipts, $370,680; total payments, $309,830; uncollected benefit orders and order for

refund of contributions, $389; total balance, $61,239. Of this total balance $58,842 is invested in bonds, the remaining $2,396 being cash on hand at the close of business on Dec. 31, 1911.

Service Order in Madison.—The Railroad Commission of Wisconsin has issued a tentative order in regard to the service of the Southern Wisconsin Railway, Madison, Wis., based upon an investigation conducted by the commission as the result of a complaint filed on Jan. 5, 1911. The recommendations of the commission which refer to schedules and to physical connections between the various lines are of local interest only, but many of the other recommendations are of general interest. The commission says that passengers may leave by either front or rear door, but that entrance at the front is optional with the company. It is pointed out that the public can facilitate movement by conforming to the company's rules and regulations in this respect. Passengers are not to be allowed to ride on the platform with the motorman. Conductors are ordered to announce crossings. No definite order is given on the subject of heating. The commission does not make a ruling concerning the sanitary conditions of the car, but it quotes from a former decision on the same subject. In the decision the commission comments upon the effect of smoking on the congestion on the rear platform, but it is held that the other changes in the handling of traffic will make the matter of smoking a less important factor in back-platform congestion.

Ordinance to Require Transfers on Chicago Elevated Railways.—As the result of an opinion rendered by Corporation Counsel W. H. Sexton, Chicago, an ordinance has been introduced in the City Council to require the four elevated railways to transfer passengers. The matter has been referred to the committee on local transportation. In his opinion Mr. Sexton said: "While the question is not without doubt we are inclined to the belief that a court would hold that the real beneficial owner of the different elevated railroad systems is the board of trustees of the voting trust, which is directing, conducting, managing and operating these systems through its appointees. The semblance of separate corporate existence maintained by the corporations and the employment of the corporate fiction of individual management and control would be cut through by a court's decision and the vital question laid open for inspection as to whether the syndicate is the real beneficial owner and the several corporations the mere technical owners. It seems in accordance with a sound rule of public policy that these corporations should not be allowed to defeat a demand for betterment in their service to the public by a subterfuge and concealment behind a cloud of legal technicalities invented probably for the very purpose of defeating any demand for a universal transfer system."

Result of Referendum Vote on Operating Questions in Brooklyn.—The final canvass of the vote cast by patrons of the Brooklyn (N. Y.) Rapid Transit Company on the two questions submited on April 17 and 18, 1912, to the riders on its surface lines, namely, a uniform near-side stop for surface cars and omitting stops in the middle of blocks more than 300 ft. long, showed 181,764 votes in favor of the near-side stop and only 17,128 against it. This is an average of less than one vote in ten in favor of the continuance of the present complicated system of near-side and far-side stops. On the question whether stops should be eliminated in the middle of blocks more than 300 ft. long, the figures were 127,943 in favor and 59,054 against. Officials of the company did not expect that the second of these questions would poll anywhere near as large a vote as the first. Steps will be taken in the near future to bring the result of this ballot to the attention of the appropriate city authorities, who are in this instance the members of the Board of Aldermen. The popular primary was undertaken under the conviction that the Board of Aldermen, as the arbiters of the use of the city streets, would welcome an expression of public opinion on this subject quite as much as the company. The confusion which now exists in these matters in Brooklyn, as explained in the Electric Railway Journal of April 13, 1912, page 636, is due to certain city ordinances adopted in part on account of considerations of public safety and in part because it had been believed that the far-side stop was desired by most people.

Personal Mention

Mr. L. D. Gillett, formerly manager of the St. Thomas (Ont.) Street Railway, has been appointed a locomotive inspector under the Dominion Railway Board, with headquarters at St. Thomas.

Mr. O. T. Gibson has been appointed trainmaster of the Columbus (Ga.) Railroad to succeed Mr. J. A. Cameron, resigned. Mr. Gibson entered the employ of the company eight years ago as a trainman and has served successively as inspector, transfer agent and assistant claim agent.

Mr. Frank Hafer, a member of the board of directors of the Toledo Railways & Light Company, Toledo, Ohio, and an official of the Milburn Wagon Company, has been elected vice-president of the Toledo Railways & Light Company to succeed Mr. L. E. Beilstein, whose resignation as vice-president and general manager of the company was noted in the Electric Railway Journal of April 20, 1912. No successor to Mr. Beilstein as general manager has yet been selected.

Mr. G. F. Soule, who has been connected with the New York, New Haven & Hartford Railroad, New Haven, Conn., for the last five years as inspecting engineer of electric line construction, has accepted the position of general foreman with the Butte, Anaconda & Pacific Railway, which is to electrify 90 miles of line in the vicinity of Butte, Mont. Mr. Soule has been identified with electric railway and transmission line construction work for some years, and was with the electrical construction and engineering departments of the Boston (Mass.) Elevated Railway for six years before becoming connected with the New York, New Haven & Hartford Railroad.

Mr. H. M. Winter has resigned as sales manager of the Seattle (Wash.) Electric Company and will open offices in both Seattle and Portland to carry on a general real estate and brokerage business. Mr. Winter was born in Gloucester, Mass. He first became identified with the electrical business in Portland, Ore., in 1903 with the Oregon Water Power & Railway Company. During his connection with this company, which continued until 1906, Mr. Winter served as paymaster and purchasing agent and also spent some time in the traffic department. Mr. Winter next became connected with the Portland office of the General Electric Company, and in April, 1908, was placed in charge of the Seattle office of the General Electric Company. He resigned from the General Electric Company on March 1, 1911, to enter the employ of the Seattle Electric Company.

Mr. Roy Henry Pinkley has been appointed head of the construction and way department of The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., with the title of engineer of way and structures, to succeed Mr. F. G. Simmons, who has been appointed commissioner of public works of Milwaukee, as announced in the Electric Railway Journal of April 20, 1912. Mr. Pinkley has been in charge of the drafting department of the company for the last five years and has also been in charge of the building department for the last two years. These departments will be consolidated with the way department. Mr. Pinkley was born in Missouri in 1878 and was graduated from the electrical engineering department of the University of Missouri in 1899. He entered the employ of the Imperial Electric Light & Power Company, St. Louis, Mo., in 1899, in the operating department. After serving two years with this company he accepted a position in Nashville, Tenn., and subsequently was connected with consulting engineers in St. Louis for eighteen months. He next entered the employ of the Union Electric Light & Power Company, St. Louis, Mo., and served with it in the operating and con-

R. H. Pinkley

struction departments. He resigned from this company in 1907 to become connected with The Milwaukee Electric Railway & Light Company. Mr. Pinkley will supervise the construction and maintenance of the company's tracks and structures and the civil engineering and drafting work. Mr. Pinkley is an associate of the American Institute of Electrical Engineers.

Mr. R. I. Guttstadt, civil engineer, Royal Prussian State Railroads, arrived in New York on April 24, 1912, to study heavy electric traction developments in the United States. Mr. Guttstadt is accompanied by his brother, Mr. Frederick R. Guttstadt, who is a lawyer, Mr. Curt Heilfron, of the Prussian State Railroads, and Mr. Wilhelm Linsenhoff, of the Provincial Prussian Railways. They are planning to stay in this country until the end of June and will visit Boston, New York, Buffalo, Chicago, St. Paul, St. Louis, Pittsburgh, Philadelphia and Washington.

Mr. C. E. Brown, who was reported in the Electric Railway Journal last week as having resigned as general passenger and freight agent of the Michigan United Traction Company, was assistant to Mr. A. W. McLimont, formerly vice-president of the Michigan Railway Engineering Company, and resigned from that position. Mr. F. W. Brown has been general express and passenger agent of the Michigan United Traction Company, and continues in that capacity. Mr. J. W. Glendening is treasurer of the Michigan United Traction Company and assistant to Mr. J. F. Collins, vice-president and general manager of the company, who is temporarily in charge of the affairs of the construction department.

Mr. T. D. Rhoades has retired as vice-president of the New York, Westchester & Boston Railway, New York, N. Y., and as receiver of the Detroit, Toledo & Ironton Railroad, Detroit, Mich., to become president of the Railway Storage Battery Car Company, New York, N. Y., which has been organized to finance and sell the output of the Edison-Beach car manufacturing plant. Mr. Rhoades has been connected with railroad work for many years. He was born in Green County, Pa., on April 27, 1858, and entered railway service in 1875 with the Empire Line. He continued in railway work until 1895 and then for three years he engaged in banking and the hotel business at Chicago. He has been connected with the New York, Westchester & Boston Railway since May 15, 1905.

OBITUARY

John L. Blessing died on April 22, 1912, at his residence in Chicago. Mr. Blessing had been a resident of Chicago for forty years, and up to fifteen years ago, when he retired as a division superintendent, was closely connected with the development of the street-railway system on the west side of the city now controlled by the Chicago Railways. He was associated for years with the late Charles T. Yerkes. Mr. Blessing was seventy-three years old.

Thomas Jefferson Coolidge, Jr., died at his home in Boston, Mass., on April 14, 1912. Mr. Coolidge was a graduate of Harvard College, Harvard Graduate School and Harvard Law School. Although banking was the chief business of Mr. Coolidge, he had many other financial interests, especially in the field of public-service companies. Up to a recent date he was director of the Edison Electric Illuminating Company of Boston, General Electric Company, Georgia Railway & Electric Company, Boston Elevated Railway, Underground Electric Railways Company, Ltd., of London, Amoskeag Manufacturing Company, and several other companies.

George T. Rehn, secretary, treasurer and general manager of the Hornell (N. Y.) Traction Company, died at his home in Hornell on April 12, 1912. Mr. Rehn was born in Philadelphia on Oct. 12, 1849, and resided there until 1858, when he removed to Natchez, Miss., where he was engaged in the plantation supply business for fourteen years. He removed to Hornell in 1892 and became general superintendent and treasurer of the Hornellsville Street Car Company, which has since, with the Canisteo Electric Railroad, been consolidated into the Hornell Traction Company. Mr. Rehn was elected president of the Chamber of Commerce of Hornell four years ago and held this position at the time of his death.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***San Ramon Valley Railroad, Danville, Cal.**—Incorporated in California as an extension of the Oakland, Antioch & Eastern Railway from Walnut Creek to Danville, a distance of 7 miles. Walter Arustem, president.

***Indianapolis, Crawfordsville & Danville Electric Railway, Indianapolis, Ind.**—Incorporated in Indiana, presumably to succeed the Indianapolis, Crawfordsville & Western Traction Company or the Indianapolis, New Castle & Northern Traction Company, the property of which companies was sold under foreclosure recently. Incorporators: Fred. A. Likely, Helen E. Clayton, John P. Tood, Walter S. Glass and Henry H. Hornbrook.

***Ellsworth-Washington Street Railway, Washington, Pa.**—Application for a charter has been made by this company in Pennsylvania to build an electric railway from Ellsworth to Somerset, Pigeon Creek, Vanceville, Opossum Run, Little Chartiers Creek, Zediker, South Strabane and Washington, a distance of about 14 miles. Incorporators: Charles S. Caldwell, John W. Warrick, I. E. Paul, L. S. Vowell and Frank B. McKinley.

***Tennessee Railway, Light & Power Company, Nashville, Tenn.**—Incorporated in Maine on April 23, 1912, with A. G. Bradley, Portland, as clerk. This company will take over the properties mentioned in the Electric Railway Journal of April 13, 1912, page 633. Authorized capital stock, $50,000,000 common and $20,000,000 preferred.

***Charleston Traction Company, St. Albans, W. Va.**—Chartered in West Virginia to build a 40-mile electric railway from St. Albans to Mount Carbon via Charleston and Montgomery. Capital stock, $250,000. Incorporators: W. G. MacCorkle, S. B. Chilton, W. T. Moore, George E. Sutherland and S. Hess, all of Charleston, W. Va.

***Chicago Short Line Railway, Madison, Wis.**—Application for a charter has been made in Wisconsin by this company to build an electric railway from Lancaster to Chicago, Ill. Capital stock, $25,000. Incorporators: A. H. Patch, Frederick Wetmore and Alexander Robertson.

FRANCHISES

Tempe, Ariz.—The Salt River Valley Electric Railway, Phoenix, has received a franchise from the Council in Tempe. This line will connect Phoenix, Scottsdale, Tempe, Mesa, Chandler, Alhambra, Glendale and Peoria. F. M. Winter, Phoenix, president. [E. R. J., March 2, '12.]

Los Angeles, Cal.—W. E. Dunn, attorney for the Los Angeles Railway, has agreed to install a third-rail on San Pedro Street, Los Angeles, under proper restrictions, provided the proposition meets the approval of H. E. Huntington, president of the company. By the tentative agreement it was proposed that the Pacific Electric Railway should have a franchise on San Pedro Street for the operation of interurban cars and that, in order to accommodate local service, a broad-gage line should be operated between Sixth and Aliso Streets.

Santa Clara, Cal.—The Peninsular Railway, San José, has received a franchise from the Board of Trustees to build a line in Santa Clara.

Hartford, Conn.—The Norwich, Colchester & Hartford Traction Company, Norwich, has asked the Board of Selectmen for a franchise to change a portion of its tracks on Oak Street to cross highways in Hillstown, Forest Street and Silver Lane and to build on Silver Street in Hartford. Most of the grading has been done on this line as far as Hillstown and the company expects to start construction this summer.

New Haven, Conn.—The Connecticut Company has asked the Board of Aldermen for a franchise to double-track and extend some of its lines in New Haven.

Griffin, Ga.—W. J. Massee, representing the Atlanta, Griffin & Macon Interurban Railway, has asked the Council

for a franchise in Griffin. The line will connect Macon, Forsyth, Barnesville, Griffin and Atlanta. [E. R. J., April 20, '12.]

Iowa City, Ia.—The Davenport, Iowa City & Western Traction Company, Pierre, S. D., has received a twenty-five-year franchise from the Council in Iowa City. This 70-mile electric railway will connect Davenport, Iowa City, Maysville and Tipton. C. E. Coon, Omaha, Neb., is interested. [E. R. J., March 23, '12.]

Chanute, Kan.—The Union Traction Company, Coffeyville, has received an extension of its franchise from the Council to build its line in Chanute.

Louisville, Ky.—The franchise created by the city of Louisville for the construction of an electric railway on Slevin Street, from Twenty-sixth to Thirtieth Street, thence to Alford and thence to Twenty-sixth Street, forming a loop, was purchased by the Louisville Traction Company at the upset price fixed in the ordinance, $100. It will be used for the extension of the Main Street line of the Louisville Railway. [E. R. J., March 23, '12.]

***Lewiston, Mont.**—George D. Cochrane, Lewiston, has asked the City Council for a franchise to build an electric railway in Lewiston.

Albany, Ore.—The Oregon Electric Railway, Portland, has received a franchise from the Council through Fifth Street in Albany.

Elco, Pa.—The Allenport & Roscoe Street Railway, a 3-mile extension of the Pittsburgh Railway's Charleroi line, has asked the Council for a franchise in Elco. If satisfactory arrangements can be made this line will be built this year from Roscoe to California.

McKeesport, Pa.—The Pittsburgh, McKeesport & Westmoreland Railway has received a franchise from the Council for a line from the city line to the business center of McKeesport.

Woodlawn, Pa.—The Woodlawn & Southern Street Railway, Woodlawn, has received a franchise from the City Council to extend its lines in Woodland.

Providence, R. I.—The Rhode Island Company, Providence, has asked the Council for a franchise to double-track and extend some of its lines in Providence and also to build the East Side tunnel.

Chattanooga, Tenn.—The Chattanooga, Rome & Atlanta Railway has received a franchise from the Council in Chattanooga. [E. R. J., Feb. 24, '12.]

***Corpus Christi, Tex.**—The Council has been asked to grant a franchise to build an electric railway in Corpus Christi to be known as the Corpus Christi Traction Company.

***Yoakum, Tex.**—E. B. Carruth, J. W. Greer and associates have received a fifty-year franchise from the Council to build an electric railway in Yoakum.

Salt Lake City, Utah.—The Utah & Salt Lake Electric Railway, Salt Lake City, has received a franchise from the Council for a franchise in Salt Lake City. This 70-mile line will connect Salt Lake City, Payson, Sandy, Draper, Murray, Lehi, Provo, Spanish Fork and Springville. A. J. Evans is interested. [E. R. J., March 9, '12.]

Chehalis, Wash.—The Washington-Oregon Corporation, Vancouver, has received a franchise from the County Commissioners to extend its line to the Coal Creek mines.

Kenosha, Wis.—The Kenosha Electric Railway has received a franchise from the Board of Aldermen to double-track Main Street and build additional track on Market Square in Kenosha.

TRACK AND ROADWAY

Lethbridge (Alta.) Municipal Tramway.—It is reported that work has been begun by this company at Stirling on its line from Lethbridge to Weyburn. John Tomothy, Edmonton, is the contractor in charge. [E. R. J., Dec. 1, '12.]

***Auburn, Cal.**—G. B. Herrington, Auburn, plans to build an electric railway in Auburn from Aeolia Heights on the eastern city limits of Auburn to the new Southern Pacific depot on Nevada Street, if the citizens of Auburn will subscribe $30,000.

San Joaquin Light & Power Company, Fresno, Cal.—Surveys will be begun at once by this company on its new line from Coalinga to the coast.

San Francisco, Napa & Calistoga Railway, Napa, Cal.—This company has awarded the contract for grading between St. Helena and Calistoga to George Cushing, Richmond.

***Tulare, Cal.**—A new line is to be built from Tulare to Visalia, Porterville and Lindsay. David Oliver, Jr., and H. M. Coffin, San Francisco, are said to be interested.

Wilmington & Southern Traction Company, New Castle, Del.—Work has been begun by this company on an extension between Rose Hill and Front Street and Market Street in Wilmington.

***Tampa, Fla.**—Lee Dekle, Tampa, and others are interested in a plan to build an electric railway to connect Tampa, Clearwater and St. Petersburg.

Hillsboro (Ill.) Railway.—This company has awarded a contract for construction of its line between Hillsboro and Taylor Springs to Driscoll & McCalman, Decatur. J. J. Frey, general manager. [E. R. J., March 2, '12.]

Springfield-Northwestern Interurban Railway, Springfield, Ill.—This company has increased its capital stock from $15,000 to $150,000. Ralph N. Baker, Springfield, president. [E. R. J., Dec. 23, '11.]

Vincennes & Southeastern Interurban Railway, Vincennes, Ind.—It is reported that this company has secured financial backing and will soon begin the construction of its line to connect Petersburg, Vincennes, Jasper, Otwell, Algiers Monroe City, Cannelton, Tell City and Newtownville. Francis B. Morgan, New York City, promoter. [E. R. J., Nov. 4, '11.]

Salina, Tipton & Northern Railway, Salina, Kan.—The State Utilities Commission has granted permission to this company to issue stock to the amount of $1,000,000. The company has planned an interurban line to extend from Salina to Osborne. [E. R. J., Feb. 24, '12.]

Kentucky Central Electric Railway, Frankfort, Ky.—This company, recently chartered in Delaware, has been organized with J. M. Richerson, Glasgow, Ky., president, and George R. Lewis, Glasgow, treasurer. Arrangements have been made with the Indianapolis Construction Company, it is stated, for financing and building the line, which will be constructed from Glasgow to Hodgenville, Ky. [E. R. J., April 13, '12.]

***Houma, La.**—Surveys are being made for an electric railway from Montegut to Thibodaux. L. Block, New Orleans, is interested.

Berkshire Street Railway, Pittsfield, Mass.—Negotiations between the Council and this company have been completed and the track laying for the northern and Kemp Park extensions in North Adams will be begun at once.

Michigan Traction Company, Kalamazoo, Mich.—More than $200,000 will be spent by this company during the summer for improvements to its lines running into Kalamazoo. Some of the lines will be rebuilt and extensions built in different parts of Kalamazoo. It is expected that the company will electrify the Fruit Belt line in the near future.

Duluth (Minn.) Street Railway.—This company plans to expend between $200,000 and $300,000 on improvements this year. Nearly 10 miles of new rails will be laid and work will soon be begun on the Ninth Street extension. Many other extensions are planned.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—Work will be resumed at once by this company, completing its line to Faribault and Owatonna.

Twin City Rapid Transit Company, Minneapolis, Minn.—Work will be begun at once by this company on the extension of its Emerson Avenue line to Forty-fourth Street in Minneapolis.

St. Paul Southern Electric Railway, St. Paul, Minn.—This railway is being built by the Interurban Construction Company. At the present time 18½ miles have been graded and the rails will soon be laid. This 130-mile electric railway will connect St. Paul, Hastings, Cannon Falls, Pine Island and Rochester. The Illinois Steel Company is furnishing the steel, corrugated culverts, etc. The American Steel &

Wire Company is furnishing the trolley wire, messenger cable guy wire and bonds, which will be of the all wire, solid terminal compressed type No. 0000 cross-section. W. L. Sonntag, St. Paul, general manager. [E. R. J., Oct. 14, '11.]

*Fillmore, Mo.—Surveys have been completed for a proposed 14-mile electric railway between Fillmore and Savannah. It is reported that this line is being planned with a view to have it become later part of the St. Joseph & Savannah Railway, St. Joseph. G. W. Spicer, Fillmore, is the promoter.

Hannibal & Northern Missouri Railroad, Hannibal, Mo.—The receivers of this company have sold the property for $2,500 to Henry Funk, the original promoter, and his associates. This railway is projected between Hannibal, Palmyra, Bethel, Sue City, La Plata and Philadelphia. [E. R. J., Jan. 13, '12.]

Missouri & Kansas Interurban Railway, Kansas City, Mo.—Plans are being made by this company to build a line from Olathe, the present terminus of the line, to Topeka.

Public Service Railway, Newark, N. J.—Work has been begun by this company on the extension of the Jackson Avenue line through the old Bergen Road to the Greenville carhouse.

Hudson & Manhattan Railroad, New York, N. Y.—This company has been granted by the Public Service Commission of the First District an extension from April 28 to June 28, 1912, in which to begin work upon the proposed extension of the railroad from Thirty-third Street to the Grand Central Station. It is estimated that this extension will cost about $5,000,000.

Columbus, Kenton & Toledo Traction Company, Kenton, Ohio.—Plans are being made by this company to begin soon the construction of its line between Findlay, Richwood, Columbus, Kenton and Toledo. The first section will be built between Findlay and Kenton. The company has again asked the Public Service Commission for authority to issue $50,000 in stock and $1,375,000 in bonds to cover the cost of the work. [E. R. J., April 13, '12.]

Oklahoma (Okla.) Railway.—Surveys have been made by this company for an extension north and west from El Reno, through Kingfisher, Kiel and Okeene, toward Woodward in western Oklahoma.

London & Lake Erie Railway & Transportation Company, London, Ont.—Plans are being considered by this company to extend its line to Aylmer, Malahide and Yarmouth.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—This company writes that its plans are not yet complete for the extension from Fort Erie to Port Colborne. Only preliminary surveys have been made for crossing the canal and no definite line has been decided upon. The surveys which have been made have all been in charge of W. P. Chapman, engineer.

Sarnia (Ont.) Street Railway.—This company plans to build an extension to Lake Huron Park pavilion.

Toronto & York Radial Railway, Toronto, Ont.—Plans have been submitted by this company to North Toronto for a new proposition for the privilege of double-tracking Yonge Street.

*Eugene, Ore.—Surveys have been made and right-of-way has been secured for a 10½-mile electric railway between Eugene and Creswell. P. E. Snodgrass and F. L. Chambers, Eugene, are interested in the project.

Errol Heights Railway, Portland, Ore.—Surveys have been completed and capital has been secured for the construction of a 1-mile railway on Knapp Avenue and East Thirty-second Street, Portland. C. W. Hodson, 269 Washington Street, Portland, president. [E. R. J., April 6, '12.]

Cumberland Railway, Carlisle, Pa.—Plans are being made by this company to begin work at once on its extension from Newville to Shippensburg and Chambersburg, a distance of about 23 miles.

Slippery Rock & Grove City Railway, Grove City, Pa.—Work will be resumed by this company in June on its line between Slippery Rock and Grove City. When the line was first taken up 6 miles were graded and abutments placed for a bridge over Wolf Creek. This line will be equipped with gasoline motor cars. J. C. Barr, Grove City, is in charge.

Pittsburgh, Monongahela & Washington Railways, Monongahela City, Pa.—Surveys will be begun at once by this company on its 14-mile line between Monongahela City and Ellsworth.

Petersburg, Pa.—Right-of-way is being secured for the 15-mile electric railway to connect Petersburg and McAlevy's Fort, via Shavers Creek Valley. Samuel Longnecker, Petersburg, and Robert Armstrong, Logan, are interested. [E. R. J., Nov. 11, '11.]

Portland Railway, Light & Power Company, Portland, Pa.—This company plans to begin work at once to lay tracks on Sandy Boulevard and Milwaukee Street in Portland.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—Surveys have been completed and the contract will soon be awarded by this company to build an extension line from Highfield to Waynesboro.

York (Pa.) Railways.—Plans are being made by this company to extend its line from Sherman and Market Streets eastward to the city limits of York.

Belle Fourche & Spearfish Electric Railway, Belle Fourche, S. D.—Surveys for this electric railway between Belle Fourche and Spearfish, a distance of 10 miles, have just been completed by A. D. Wilson, Deadwood, and plans for securing the right-of-way are complete. A. A. Moodie, Belle Fourche, is interested. [E. R. J., Nov. 18, '11.]

*Centerville, Tenn.—John W. Frye and others, of Centerville, plan to construct a hydroelectric plant near Centerville. It is stated that current will be used for the operation of an interurban line. J. C. Keifer, said to represent Cincinnati interests, is also negotiating for sites along Duck River, in the neighborhood of Centerville and his plans are understood to have to do with interurban developments.

Memphis (Tenn.) Street Railway.—Negotiations have been closed for the extension of the Jackson Avenue line through the new subdivision owned by the Speedway Land Company. This line will be built as soon as the franchise ordinance which is now being prepared is passed.

*Dallas, Tex.—A company is being formed to build a 54-mile electric railway between Dallas and Greenville and other north Texas towns. Among those interested are: J. B. Wilson, William Doran, Henry L. Seay, H. O. Samuell, John V. Hughes and R. H. Stewart of Dallas, D. T. Bomar and William Ward of Fort Worth.

Dallas Consolidated Electric Street Railway, Dallas, Tex.—This company has placed contracts to rebuild its Bryan Street line in Dallas from Cantegral Street to St. Joseph Street, replacing the present 77½-lb T-rails with 80-lb T-rails, the street to be paved with bitulithic pavement with wood block headers against rail. The track is to be built on a 6-in. concrete foundation.

Bay Shore Rapid Transit Company, La Porte, Tex.—Surveys are being made and other preliminary work is under way by this company to build an interurban line along the Houston ship channel from Houston to La Porte. Gasoline motor cars will be used. S. F. George has charge of the local details of the work. [E. R. J., May 6, '12.]

Logan Rapid Transit Company, Logan City, Utah.—This company has awarded a contract for ties, etc., for the construction of 20 miles of its line to the Oregon Lumber Company. The line will extend through Cache County and connect Hyrum, Logan City, Smithfield and Richmond. The Commissioners of Cache County have signified their willingness to grant the company a franchise through Cache County. Robert Anderson, Ogden, general manager.

Ogden (Utah) Rapid Transit Company.—Improvements to cost approximately $75,000 and constituting 4 miles of extensions to the present lines in Ogden have been announced by this company.

Richmond & Rappahannock River Railway, Richmond, Va.—Surveys have been begun by this company at Fair Oaks. Charles L. Burnsville, N. C., president. [E. R. J., April 13, '12.]

Whatcom County Railway & Light Company, Bellingham, Wash.—This company has been asked to consider plans to extend its line in the Geneva district.

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—This company will build new repair shops and terminals in San Bernardino in the near future.

San Ramon Valley Railroad, Walnut Creek, Cal.—This company has purchased a tract of land in Walnut Creek to be used as a site for a station. Frederick E. Brooke is interested.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—Work will be begun within a few weeks by this company on the construction of a new freight station in Fort Wayne. The structure will be 119 ft. x 30 ft. The cost is estimated to be about $10,000.

Des Moines (Ia.) City Railway.—Bids are being asked by this company for the construction of its new carhouse in Des Moines. The structure will be one story, 211 ft. x 183 ft. and of brick construction. [E. R. J., March 30, '12.]

Hutchinson & Northern Railway, Hutchinson, Kan.—This company plans to build an interurban station at the corner of Avenue B and Walnut Street, Hutchinson. The station, it is planned, would be the central passenger depot for this company and the Hutchinson & Western Railway, and possibly the Union Pacific Railroad. C. O. Hitchcock, Hutchinson, is interested.

Wichita Railroad & Light Company, Wichita, Kan.—Abandoned as a power plant by this company a year ago, the old building at Tenth and Wichita Streets, Wichita, is to be transformed into a machine shop and equipped with new machinery to cost $10,000.

POWER HOUSES AND SUBSTATIONS

British Columbia Electric Railway, Ltd., Vancouver, B. C.—During the next few months this company will award contracts to build two substations, one with a 1000-kva capacity and the other with a 3000-kva capacity.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—This company has ordered a 750-kw motor-generator set, consisting of a 11,000-volt synchronous motor and a generator delivering direct current at 1300 volts, from the Westinghouse Electric & Manufacturing Company.

East Shore & Suburban Railway, Richmond, Cal.—This company has ordered one 1500-kw motor-generator set, consisting of a 10,000-volt, 60-cycle, synchronous motor and a 600-volt, direct-current generator, from the Westinghouse Electric & Manufacturing Company.

Jersey Central Traction Company, Keyport, N. J.—This company has awarded a contract for a 1500-kw turbo-generator for its power plant.

Rochester Railway & Light Company, Rochester, N. Y.—Specifications are being prepared by this company for a new power station to be built in the near future. The new station will be located in the eastern part of Rochester, but at what point has not been decided.

Beaver Valley Traction Company, New Brighton, Pa.—During the next few months this company will purchase tubes for retubing a 200-hp Stirling boiler.

Fairmount Park Transportation Company, Philadelphia, Pa.—This company advises that it has just installed two new Babcock & Wilcox boilers at its power plant.

Whatcom County Railway & Light Company, Bellingham, Wash.—This company plans to build a new substation in Bellingham.

Seattle (Wash.) Electric Company.—This company has ordered two 1500-kw motor-generator sets, delivering 250-volt direct current, for operation on a three-wire system, from the Westinghouse Electric & Manufacturing Company. The three motors are three-phase, 13,200-volt, synchronous type.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis.—During the next few months this company will award contracts to build a new substation in Eau Claire. The structure will be 50 ft. x 60 ft.

Chicago & Wisconsin Valley Railway, Madison, Wis.—This company plans to build power plants at Middleton Junction and at Wausau in the near future. Allen T. Russell, Chicago, general manager.

Manufactures and Supplies

ROLLING STOCK

Springfield (Mass.) Street Railway expects to purchase five express cars.

Worcester (Mass.) Consolidated Street Railway is in the market for three gondola cars.

Los Angeles (Cal.) Railway Corporation has ordered fifty cars and trucks from the American Car Company.

South Covington & Cincinnati Street Railway, Covington, Ky., has ordered twenty single-truck cars from the St. Louis Car Company.

City & Suburban Railway, Brunswick, Ga., has ordered one 25-ft. 6-in. semi-convertible car body with trucks from The J. G. Brill Company.

Boston (Mass.) Elevated Railway has ordered thirty-five double-truck semi-steel body cars from the St. Louis Car Company and forty cars from the Laconia Car Company.

Cape May, Delaware Bay & Sewell's Point Railroad, Cape May, N. J., has ordered two 18-ft. 3-in. storage battery motor bodies and two special single trucks from The J. G. Brill Company.

Milwaukee Railway & Light Company, Milwaukee, Wis., has ordered one 7-ton locomotive equipped with two Westinghouse No. V-49 motors and K-45 control from the Westinghouse Electric & Manufacturing Company.

TRADE NOTES

L. R. Pomeroy, New York, N. Y., consulting engineer, has moved his office to 105 West Fortieth Street, New York.

Frederick V. Henshaw, New York, N. Y., will remove his office on May 1 to the Bankers' Trust Building, 14 Wall Street, New York.

A. M. Kittredge has resigned as president of the Barney & Smith Car Company, Dayton, Ohio, after thirty-two years of continuous service.

H. D. Walbridge & Company, New York, N. Y., will remove their offices on April 29 to the Bankers' Trust Building, 14 Wall Street, New York.

McGuire-Cummings Manufacturing Company, Chicago, Ill., has moved its general offices to the eighth floor of the Harris Trust Building, Chicago.

W. S. Barstow & Company, Inc., New York, N. Y., managing engineers, have elected George C. White, Jr., and Lucien Hamilton Tyng directors.

Curtain Supply Company, Chicago, Ill., announces that it has added to its Western organization a new representative, Fred M. Egolf, and to its Eastern organization, George E. Fox.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has elected Paul M. Warburg, of Kuhn, Loeb & Company, a director to succeed Charles A. Moore, who resigned.

Brown & Clarkson, Washington, D. C., composed of M. N. Brown and C. D. S. Clark, with headquarters in the Southern Building, Washington, will act as mining and topographic engineers.

Montreal Engineering Company, Ltd., Montreal, Que., on May 1 will move its headquarters to Toronto, Ont., where it will have offices in the Bell Telephone Building, 76 Adelaide Street West.

Niles-Bement-Pond Company, New York, N. Y., on May 1 will remove the Chicago office from the Commercial National Bank Building to the McCormick Building, 332 South Michigan Avenue, Chicago.

Indianapolis Brass Company, Indianapolis, Ind., is constructing two new buildings as additions to its main factory. The steadily increasing business of the company has made the new buildings necessary.

Queen & Company, Philadelphia, Pa., manufacturer of scientific and electrical instruments, has been placed in the hands of Richard S. Hunter, receiver, by Judge McPherson, of the United States District Court.

W. R. Garton Company, Chicago, Ill., will move to new quarters at 15-21 South Desplaines Street on May 1. This

move is necessitated by the increased business during the past two years. The company has recently taken the agency for Waterbury wire, ropes and cables.

Hoeschen Manufacturing Company, Omaha, Neb., has appointed Joseph William Peck its sales engineer. Mr. Peck has been assistant signal engineer of the Union Pacific Railroad since 1907, and previous to that time he was connected with the Union Switch & Signal Company for three years.

Duplicator Manufacturing Company, Chicago, Ill., has moved its office from the Old Colony Building to 1170 Monon Building, where ample warehouse and shipping room space has been secured. This company has recently opened a branch office at 50 Church Street, New York, N. Y., and another in the Piper Building, Baltimore, Md.

T. H. Symington Company, Baltimore, Md., has elected Charles J. Symington, formerly general sales agent at Chicago, vice-president in charge of sales, with headquarters in New York. Thomas C. de Rosset, sales agent, has been appointed manager of Eastern sales, with headquarters in Baltimore, vice John F. Symington, who has resigned to become associated with the banking house of Hambleton & Company, of Baltimore.

Haskell & Barker Car Company, Michigan City, Ind., announces that Robert E. Frame has become connected with the company. Mr. Frame was connected with the shops of the Pullman Company, Chicago, for seven years. For a time he was estimating engineer for the Western Steel Car & Foundry Company, Chicago, and in 1901 was appointed assistant mechanical engineer of the American Car & Foundry Company, with office at St. Louis, Mo., later being appointed mechanical superintendent at St. Louis. In November, 1909, he was transferred to Chicago in the office of first vice-president and general manager, from which position he has just resigned.

Union Switch & Signal Company, Swissvale, Pa., announces that J. J. Cozzens has become connected as a representative of the company. Mr. Cozzens began his signal work on the West Pennsylvania division of the Pennsylvania Railroad in 1886, where he served as signal foreman for six years. On March 1, 1892, he entered the employ of the Union Switch Signal Company as foreman, and in November, 1893, he became connected with the New York Central & Hudson River Railroad as general signal foreman. After acting as foreman for the Standard Signal Company for several years, Mr. Cozzens returned to the New York Central & Hudson Railroad in 1901 as assistant supervisor of signals and was later made assistant signal engineer of the Western district. In 1909 he was appointed chief engineer of the Kinsman Block System Company, where he remained until the company suspended business operations in 1911.

Griffin S. Ackley, president and manager of the Ackley Brake & Supply Company, New York, N. Y., and inventor of the Ackley adjustable no-staff brakes, found tramway trade conditions in Europe, where he has been traveling, generally very satisfactory. He stated that almost all the important lines in Russia are adopting these brakes and that the Berlin company is filling a contract for Ackley adjustable brakes for all the cars in Vienna. Mr. Ackley reports that the Cie Française des Freins Ackley, Paris, has secured several large orders for no-staff brakes from roads whose conditions demanded more platform room. Several of the largest tramways in Spain are also using the no-staff on this account. In Belgium most of the local tramways are using Ackley brakes and the Belgian car builders are shipping cars equipped with Ackley brakes all over the world. The British Ackley Brake Company has been very successful in the introduction of Ackley brakes in the British Isles and colonies, where interest in the no-staff brake is heightened by the plans for experimenting with prepayment cars on several lines.

Ralph Sanger has resigned his active interest in the firm of Wonham, Sanger & Bates, New York, N. Y., to become vice-president of the Atlantic Vehicle Company. This company is a new organization with a strong financial backing which is placing on the market a complete line of electric trucks and delivery wagons in five sizes ranging from 5 tons to 1000 lb. in capacity. Its factory is at North Newark, N. J., and its offices and showrooms are at 1600 Broadway, New York. The president of the company is McKinley Boyle, president of the Continental Car & Equipment Company, Louisville, Ky., and also president of the Louisville, New Albany & Corydon Railroad. The chief engineer of the new company is Arthur J. Slade, widely known in the automobile industry and considered one of the best authorities on motor trucks in the country. Mr. Sanger states that the Atlantic Vehicle Company has ample capital and is planning to manufacture and equip motor tower wagons, trolley emergency wagons and other automobile trucks of special design for different phases of electric railway service. Herbert L. Satterlee, general counsel for the company, had charge of the organization of the company.

General Railway Equipment Company, New York, N. Y., has been incorporated in Maine with an authorized capital stock of $15,000,000, to manufacture railway equipment, principally complete systems of automatic safety equipment. The capital stock is divided into $5,000,000 of 7 per cent preferred, cumulative stock after May 1, 1913, and $10,000,000 common stock, the par value of the shares being $100. The present issue of $1,500,000 preferred and $4,500,000 common stock has been authorized to take over the following companies, which have an outstanding capital stock of $2,155,000: United States Electric Company, National Telephone Selector Company, Sandwich Electric Company, Electric Switch & Signal Company, Charter Electric Company, Sandwich Pole Changer Company, and International Telegraphic Call Company. The directors will be as follows: Newman Erb, Jules S. Bache, of J. S. Bache & Company; James Gayley, former first vice-president of the United States Steel Corporation; W. G. Besler, vice-president and general manager of the Central Railroad of New Jersey; John W. Griggs, ex-Governor of New Jersey; C. N. Sigison, treasurer of the United States Electric Company, and George M. Seeley, vice-president of the National Telephone Selector Company. The corporation will also act as agent in this country for the Allgemeine Elektricitäts Gesellschaft, of Berlin. Roland W. Mann, 15 Broad Street, New York, N. Y., is syndicate manager.

ADVERTISING LITERATURE

Watson-Stillman Company, New York, N. Y., has issued a 64-page catalog which lists and illustrates numerous types and sizes of hydraulic benders manufactured by the company.

Vereinigte Isolatorenwerke Aktiengesellschaft, Berlin-Pankow, Germany, has issued a circular showing views of its apparatus for making electrcal car and shop tests to determine defects in motor and control equipment.

E. Keeler Company, Williamsport, Pa., has issued a 46-page catalog in which the Keeler water-tube boiler is described. Numerous illustrations are presented which show this type of boiler installed in plants in various parts of the country.

Bucyrus Company, South Milwaukee, Wis., publishes in *Steam Shovel News* for April, in addition to interesting notes of the field, the following articles: "Revolving Shovel Excavation in Frozen Ground" and "The Truckee-Carson Irrigation Project."

Trussed Concrete Steel Company, Detroit, Mich., has issued the Trus-Con handbook, which is devoted particularly to the subjects of waterproofing, damp-proofing and technical paints. The publication contains a complete discussion of all the various methods of protecting masonry, concrete, plaster and steel against water, dampness, etc. Full analyses of various conditions are treated, and a particular remedy is suggested in each case. Specifications and directions for use of various methods and materials are given in detail.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has issued Leaflet No. 2446, which describes and illustrates type QK electrically operated brakes for direct-current crane and hoist motors. Leaflet No. 2449 describes types 536 and 537 hand-operated controllers for light crane and hoist service. Type SP electrically operated brakes designed especially for mill and crane service, built in sizes of from 5 hp to 200 hp, are described in Leaflet No. 2447. Three-wire direct-current generators are described together with their principle of operation in a 16-page circular issued by the company.